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WAR MACHINE

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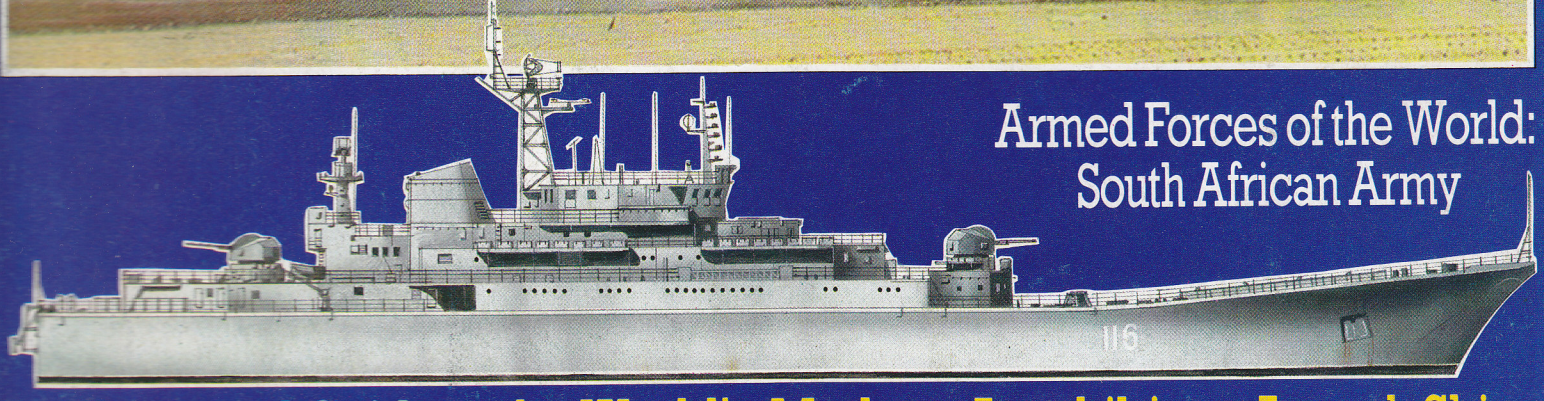
Soviet Naval Infantry and Air Cushion Vehicles

The Soviet Amphibious Assault

American Amphibious Forces

'Fearless' in Action



Armed Forces of the World: South African Army

An Illustrated Guide to the World's Modern Amphibious Assault Ships

WAR MACHINE

Volume 1 **Issue 7**

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Armed Forces of the World:

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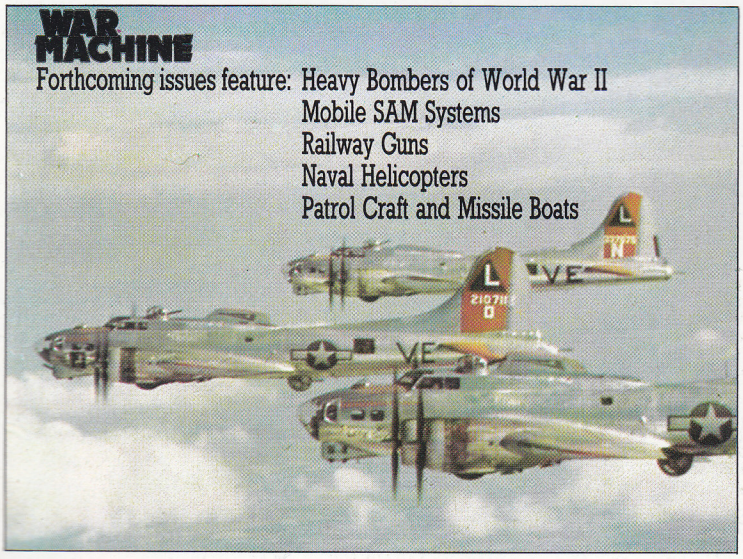

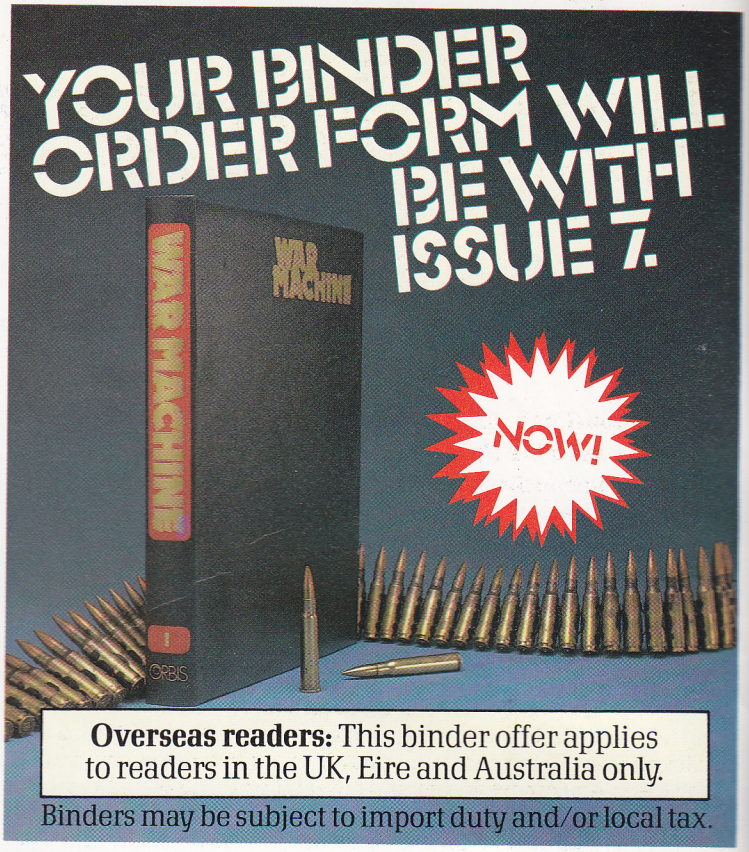

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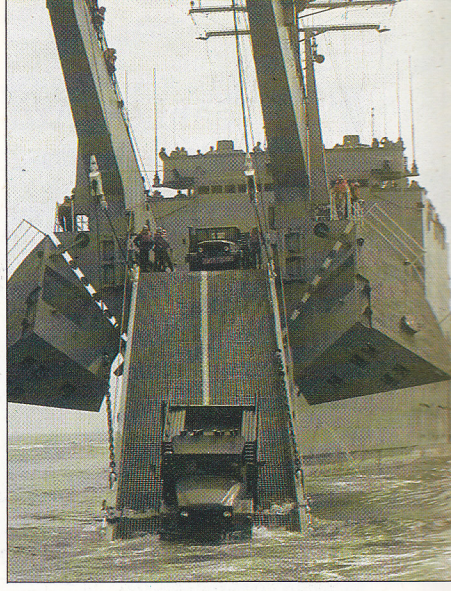
Amphibious Assault Ships



The 1982 conflict in the Falkland Islands has demonstrated that today, as in the Pacific operations or invasion of occupied Europe during World War II, the amphibious task force is still one of the most effective methods of projecting power over long distances.

In order to operate at the sustained 20-kt speed of modern US amphibious squadrons, the latest LSTs no longer have bow doors, and vehicles are unloaded over the pointed bow by means of a ramp.

Amphibious warfare ships have been in service since before Christ: the Romans, for example, used such vessels to transport elements of their legions in cross-Channel raids in the 1st century BC before their invasion of Britain in the 1st century AD. Since then the art and tactics of conducting amphibious assaults have been continually refined, World War II from 1939 to 1945 being a peak in the evolution. Particularly in their Pacific island-hopping campaigns, the Americans created new designs of ships and equipment for amphibious landings. The war also proved the idea of strategic landings, such as those conducted during the June 1944 D-Day assault on Normandy, in which whole armies and their resources were committed in an invasion to gain a specific strategic objective. When this war finished the lessons learnt were applied in the 1950s to the American landing at Inchon in the Korean War and to the Anglo-French landing at Suez in 1956. This latter landing saw the use of helicopters by the Royal Navy in the helicopter assault role.

The Americans digested the data from these conflicts and then produced the multi-role ship concept of the modern Landing Ship Dock (LSD), Amphibious Transport Dock (LPD) and Amphibious Helicopter Carrier (LPH), in which a single hull could combine the roles that were previously undertaken by several ships. The object was both to improve the amphibious force's capabilities and to decrease the number of vessels in a force. The Vietnam War allowed some validation of these designs and of the combat use of helicopters and resulted in the ultimate in very large multi-purpose ships, namely the 'Tarawa' class of LHA and the new amphibious assault dock (LHD) class that is under construction. Both these classes are virtually self-contained in practically all the equipment required to conduct a landing.

The most recent amphibious operations were conducted in 1982 as parts of the Falkland Islands war and the Israeli invasion of southern Lebanon. The former was a classic by the Royal Navy in terms of the projection of an amphibious assault force over 11250 km (7000 miles) and then the undertaking of the assault without the loss of any amphibious warfare vessel in an operational area only some 650 km (400 miles) from the enemy coast. The Israelis demonstrated that the Soviet operational tactic (supporting ground forces by landing battalion-sized and larger formations of mechanized infantry in the enemy's rear to seize specific objectives and to cut lines of communication and supply) works extremely well in practice.

One disadvantage of the amphibious assault is that it is relatively slow in its approach, although the Americans have solved this somewhat by the use of prepositioned merchant ships carrying the heavy equipment and supplies required, the US Marines to be kitted out with the equipment being flown into a friendly country near the scene of the conflict to marry up with it at a suitable port. The disadvantage of this is that friendly countries are required to give facilities, whereas the amphibious task force is virtually autonomous within the operational area. The latest addition to the amphibious warfare armoury is the Air Cushion Vehicle (ACV) to provide very rapid and relatively safe beach assault capabilities. The Soviet navy is the world's leading exponent of this tactic with some four types of ACV in service. The Americans are in the process of introducing this type into service over the next few years.

The amphibious assault ship HMS Fearless *and the V/STOL carrier HMS* Hermes *complete the transfers of assault units immediately prior to the British assault on the Falkland Islands.*

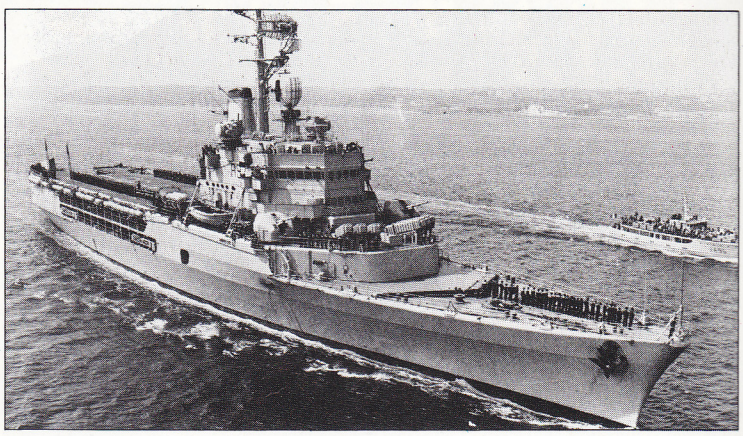
FRANCE

'Jeanne d'Arc' Class Helicopter Carrier

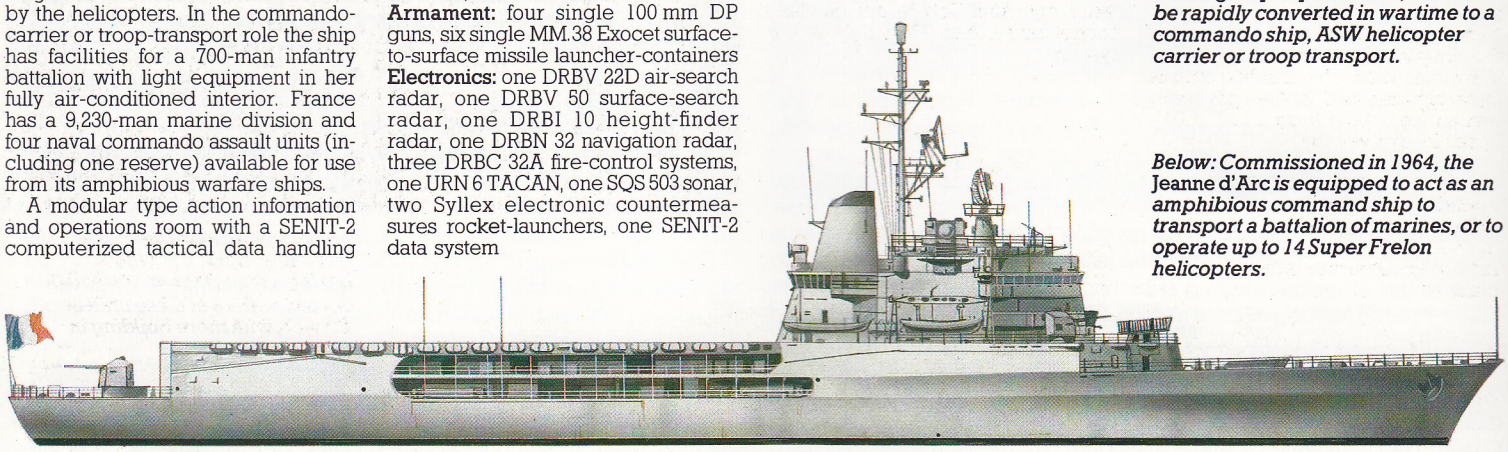
The single vessel of the **'Jeanne d'Arc'** class was laid down at Brest Naval Dockyard in 1960, launched in 1961 and commissioned in 1964. Although used in peacetime as a training ship for 192 officer cadets, *Jeanne d'Arc* (R97) can be rapidly converted for wartime use as an amphibious assault, anti-submarine warfare or troop transport vessel. The helicopter platform is 62 m (203.4 ft) wide and is connected to the hangar deck by a 12218 kg (26,935-lb) capacity elevator located at the after end of the flight deck. The deck is capable of flying-on two Aérospatiale SA 321 Super Frelon heavy-lift helicopters and can accommodate a further four parked. The hangar, with some internal modifications, can accommodate a further eight helicopters. At the aft end extensive machine, inspection and maintenance workshops are sited with weapon handling rooms and magazines for the armaments carried by the helicopters. In the commando-carrier or troop-transport role the ship has facilities for a 700-man infantry battalion with light equipment in her fully air-conditioned interior. France has a 9,230-man marine division and four naval commando assault units (including one reserve) available for use from its amphibious warfare ships.

A modular type action information and operations room with a SENIT-2 computerized tactical data handling system is fitted, together with a separate helicopter control bridge and a combined command and control centre for amphibious warfare operations. On each side of the funnel two LCVPs are normally carried.

Specification:
Name: *Jeanne d'Arc*
Commissioned: 1 July 1964
Displacement: 12,365 tons full load
Dimensions: length 182 m (597.1 ft); beam 24 m (78.7 ft); draught 7.3 m (24 ft)
Propulsion: two geared steam turbines delivering 40,000 shp to two shafts
Speed: 26.5 kts
Complement: 627 (31 officers plus 596 enlisted men)
Troops: 700
Cargo: eight Super Frelon heavy-lift helicopters in hangar plus further six on deck; four LCVPs
Armament: four single 100 mm DP guns, six single MM.38 Exocet surface-to-surface missile launcher-containers
Electronics: one DRBV 22D air-search radar, one DRBV 50 surface-search radar, one DRBI 10 height-finder radar, one DRBN 32 navigation radar, three DRBC 32A fire-control systems, one URN 6 TACAN, one SQS 503 sonar, two Syllex electronic countermeasures rocket-launchers, one SENIT-2 data system



Above:** The French navy's helicopter carrier* **Jeanne d'Arc.** ***Used as a training ship in peacetime, she can be rapidly converted in wartime to a commando ship, ASW helicopter carrier or troop transport.



Below:** Commissioned in 1964, the* **Jeanne d'Arc** ***is equipped to act as an amphibious command ship to transport a battalion of marines, or to operate up to 14 Super Frelon helicopters.

FRANCE

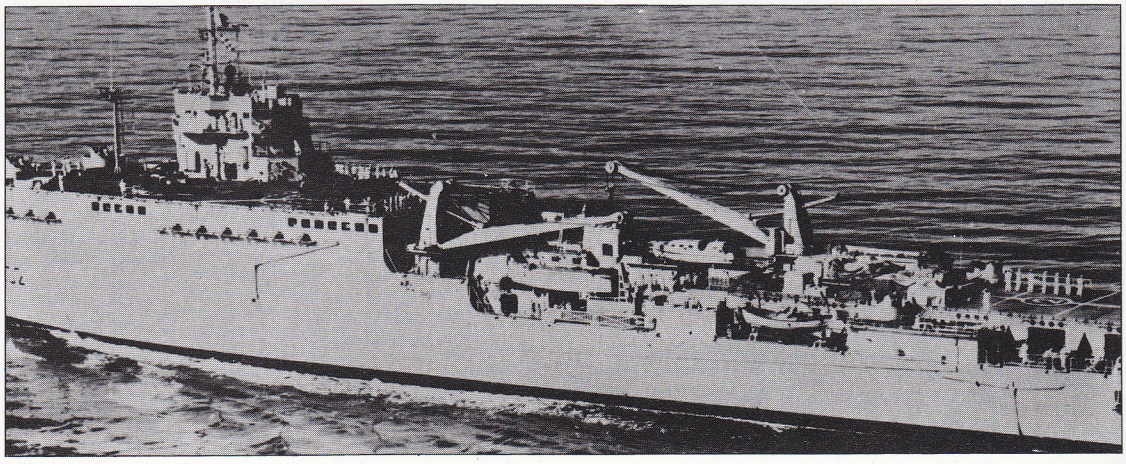
'Ouragan' Class Landing Ships Dock (TCD)

The **'Ouragan'** class of dock landing ship is used both for amphibious warfare and logistic transport by the French. They are fitted with a 120-m (397.7-ft) long well dock that has a stern gate measuring 14 m (45.9 ft) by 5.5 m (18 ft). The well dock can accommodate two 670-ton full load EDIC LCTs (carrying 11 light tanks, or 11 trucks or five LVTs) or 18 LCM6s (carrying 30 tons of cargo or vehicles). Above the well deck is a 36-m (79.4-ft) long six-section removable helicopter deck capable of operating one Aérospatiale Super Frelon heavy-lift helicopter or three Aérospatiale Alouette utility helicopters. If required, a 90-m (295.3-ft) long temporary deck can also be fitted to stow cargo or vehicles, but its use reduces the number of landing craft carried as half the well deck is taken up. If used with this extra deck as a logistic transport then the total cargo capacity of the vessel becomes some 1,500 tons. This can comprise either 18 Super Frelon or 80 Alouette helicopters, or 120 AMX-13 light tanks or 84 DUKW amphibious vehicles or 340 jeeps or 12 50-ton barges. There is a permanent helicopter deck for up to three Super Frelons or 10 Alouettes located next to the starboard bridge area. Two 35-ton capacity cranes handle the heavy equipment carried. Each of the two ships also has command and control facilities to operate as amphibious force flagships. They also carry an extensive range of repair and maintainance workshops to support the units embarked. Troop accommodation is provided for 349 men under normal conditions, although 470 can be carried for short distances. Three LCVPs are carried as deck cargo.

The *Orage* (L9022) is allotted to the French Pacific nuclear experimental centre as the logistic transport to and from France. It is also employed as the centre's floating headquarters, employing a modular facility within the well deck area. Both the *Orage* and *Ouragan* (L9021) are due to be replaced in the late 1980s.

Specification:
Names: *Ouragan* (L9021) and *Orage* (L9022)
Commissioned: L9021 1 June 1965; L9022 1 April 1968
Displacement: 8,500 tons full load
Dimensions: length 149 m (488.9 ft); beam 23 m (75.4 ft); draught 5.4 m (17.7 ft)
Propulsion: two diesels delivering 8,600 hp to two shafts
Speed: 17 kts
Complement: 211 (10 officers plus 201 enlisted men)
Troops: 349 (14 officers plus 335 enlisted men) normal, or 470 overload
Cargo: 1,500 tons as logistic transport; two LCTs, or 18 LCMs plus 3 LCVP for amphibious operations
Armament: four single 40-mm AA guns, two 120-mm mortars (L9021 only)
Electronics: one DRBN 32 navigation radar, one SQS 17 sonar (L9021 only)

Used for both amphibious warfare and as a logistic transport,* Ouragan** ***is capable of deploying and supporting half a battalion of marines (349 men).



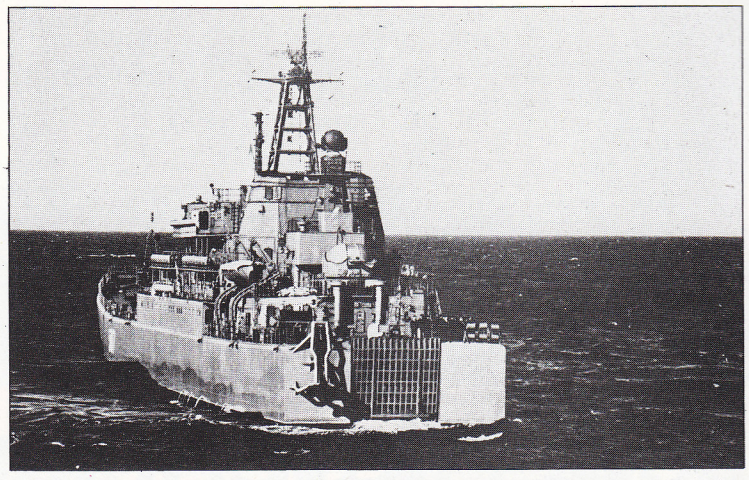
USSR

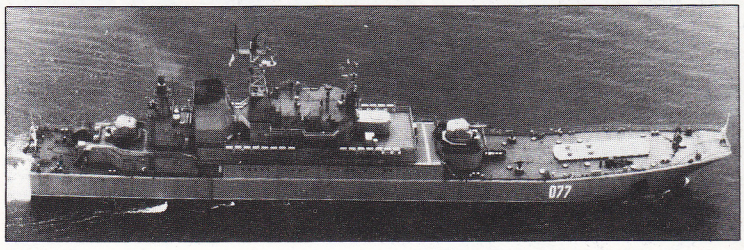
'Ropucha' Class Landing Ships Tank

Designated *Bol'shoy Desantnyy Korabl'* (BDK) or large landing ship by the Soviets, the **'Ropucha'** class has been in series production at the Polish Polnocny shipyard, Gdansk since 1975 for the Soviet navy. The class is designed for roll-on/roll-off operations with both bow and stern doors. The 630 m^2 (6,780 sq ft) vehicle deck stretches throughout the conventional LST-type hull. Two spaces for multiple rocket-launchers are provided forward. Some units have had four quadruple SA-N-5 'Grail' SAM launchers fitted to supplement the two twin 57-mm AA guns carried. The multi-level superstructure has been specially built to accommodate the 230 men of two Soviet Naval Infantry companies for extended periods. This, together with the capacity for carrying 24 AFVs or 450 tons of cargo, allows the Soviet navy to employ these ships on distant ocean operations. There are currently some 13 in service with the Soviet navy, whilst another was transferred to the People's Democratic Republic of Yemen in 1979. The building rate is currently assessed at two per year, and all those built have minor differences in appearance.

The 'Ropucha' Class can accommodate two companies (230 men) of Soviet Naval Infantry for extended periods, allowing the USSR naval assault capacity far from Soviet home waters.

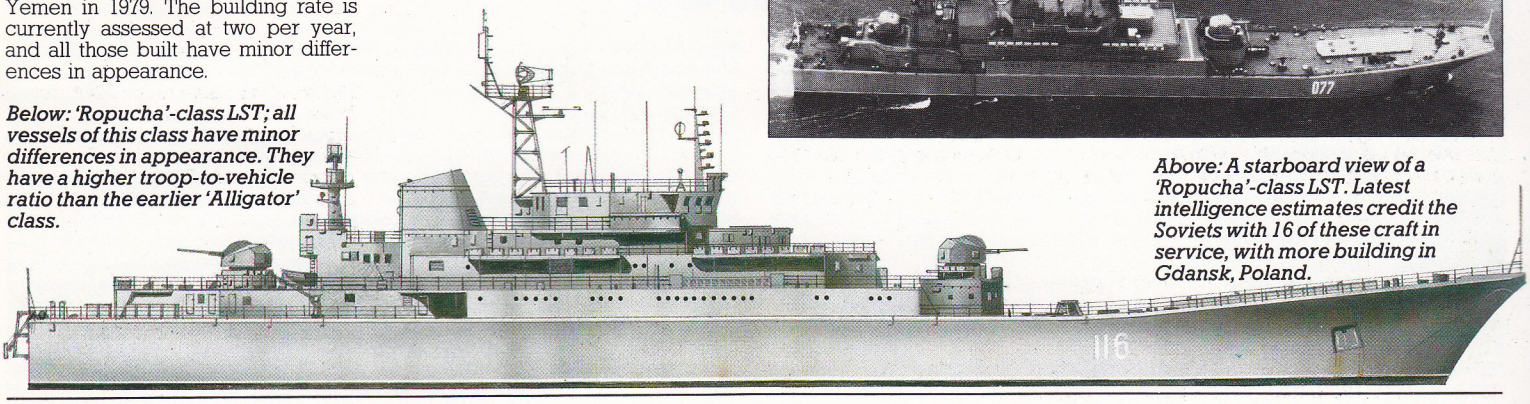
Specification:
Class number: 13, plus more building
Displacement: 4,400 tons full load
Dimensions: length 110 m (360 ft); beam 14.5 m (47.6 ft); draught 3.6 m (11.5 ft)
Propulsion: four diesels delivering 10,000 hp to two shfts
Speed: 17 kts
Complement: 70
Troops: 230
Cargo: 24 AFVs or 450 tons of stores
Armament: two twin 57-mm AA guns, and four quadruple SA-N-5 SAM launchers on some units
Electronics: one 'Don-2' navigation radar, one 'Strut Curve' air-search radar, one 'Muff Cob' 57-mm gun fire-control radar, one 'High Pole-B' IFF system





Above: A starboard view of a 'Ropucha'-class LST. Latest intelligence estimates credit the Soviets with 16 of these craft in service, with more building in Gdansk, Poland.

Below: 'Ropucha'-class LST; all vessels of this class have minor differences in appearance. They have a higher troop-to-vehicle ratio than the earlier 'Alligator' class.



USSR

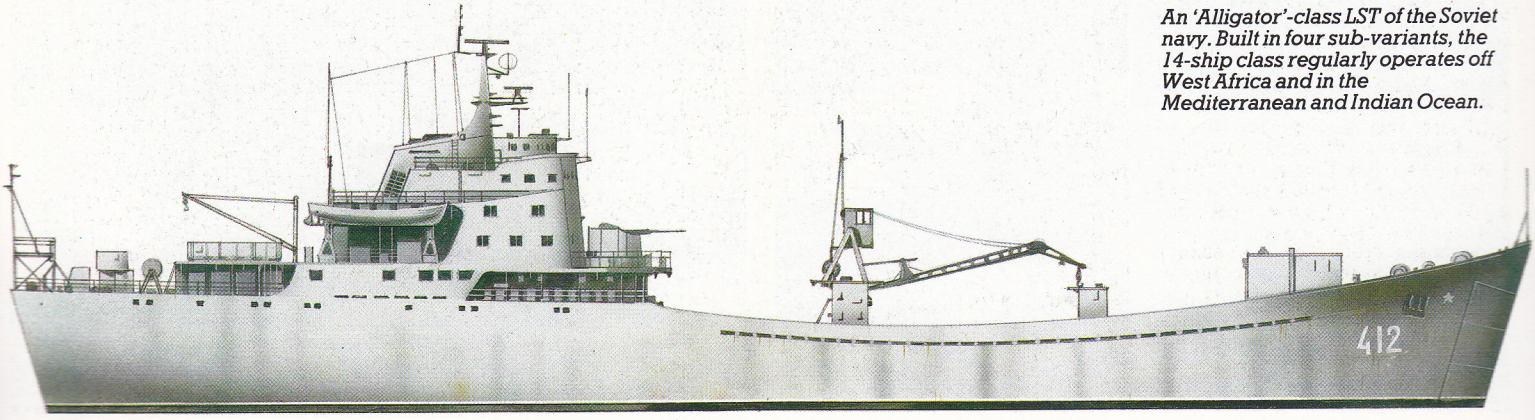
'Alligator' Class Landing Ships Tank

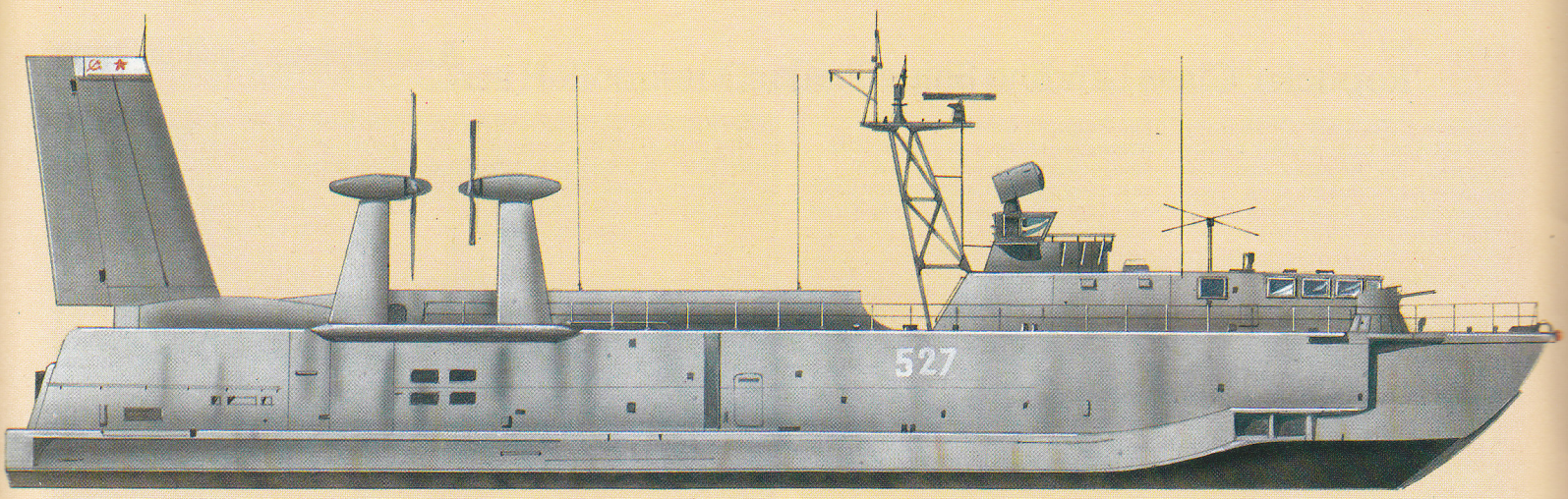
Designated *Bol'shoy Desantnyy Korabl'* (BDK) or large landing ship by the Soviets, the 14-ship **'Alligator'** class was built at the Kalingrad shipyard between 1964 and 1977. During this time the roll-on/roll-off bow and stern door design evolved to form four distinct sub-classes. The first two series are primarily for the transport role whilst the remaining two are primarily for the over-the-beach assault role. The latter two classes have a navalized split 40-round BM-21 122-mm rocket-launcher pedestal mount fitted for shore bombardment purposes. The deck crane equipment also varies within the variants: Type I has one 15-ton capacity and two 5-ton capacity cranes, whilst Types II, III and IV have only one 15-ton capacity crane. The Type III also has a raised superstructure and a forward deckhouse for the rocket-launcher; the Type IV is similar to the Type III but with additional 25-mm AA guns.

The ships are designed to carry the equipment required by a Naval Infantry battalion landing team, although the ships can also accommodate a Naval Infantry company for long periods. The vehicle parking area includes the upper deck, and both the SA-9 'Gaskin' SAM mounted on the BRDM-2 and the tracked ZSU-23-4 AA gun system have been observed on this deck, operating in pairs to supplement the ship's normal AA armament. Most of the class are currently being fitted with two quadruple SA-N-5 'Grail' SAM close-range launcher systems. The Type IVs have in addition two 25-mm AA gun mountings on the centreline abaft the bridge superstructure. The class regularly operates off the coastline of West Africa, in the Mediterranean and the Indian Ocean.

Specification:
Class numbers: four Type I, two Type II, six Type III and two Type IV
Commissioned: 1966 to 1977
Displacement: 4,500 tons full load
Dimensions: length 114 m (374 ft); beam 15.5 m (50.8 ft); draught 4.5 m (14.7 ft)
Propulsion: two diesels delivering 9,000 bhp to two shafts
Speed: 18 kts
Complement: 100
Troops: 120 normal, 250 overload
Cargo: typically 50 AFVs
Armament: one twin 57-mm AA gun, two twin 25-mm AA guns (Type IV only), one 40-round 122-mm rocket-launcher (Types III and IV), two quadruple SA-N-5 SAM launchers being fitted in most
Electronics: two 'Don Kay' or one 'Don-2' and one 'Spin Trough' navigation radars, one 'Muff Cob' 57-mm fire-control radar in some, one 'High Pole-B' IFF system

An 'Alligator'-class LST of the Soviet navy. Built in four sub-variants, the 14-ship class regularly operates off West Africa and in the Mediterranean and Indian Ocean.





An 'Aist'-class air cushion vessel of the Soviet navy. Currently still in production at Leningrad, 'Aist'-class vessels bear the Soviet designation Maly desantnyy korabl' na vozdushnoy podushke *(small air cushion vehicle).*

Soviet Naval Infantry and Air Cushion Vehicles

Following the Russian revolution in 1917 and during the ensuing Civil War of 1917 to 1922 the first Soviet naval infantry units were formed. This force was disbanded at the conclusion of the Civil War and not re-established until 1939. The peak force level reached was around 500,000 during World War II; afterwards the force was reduced in size and numbers until it was disbanded sometime in the mid-1950s. No indication of its third re-establishment was noticed until after 1964. By 1977 the new Naval Infantry had expanded to its present strength of 12,000 men; these are organized into five regiments, which are operationally subordinated to the Soviet Navy fleet commanders. One regiment is attached to each of the Northern, Baltic and Black Sea Fleets, whilst the remaining two form a divisional grouping in the Pacific Fleet. The 2,000-man strong regiments follow the triangular organization of the Soviet army motorized rifle regiment, with the exception that its tank battalion has a company of medium tanks in addition to three companies of PT-76 light amphibious tanks. In 1982 the regiments underwent a reorganization programme to increase their organic firepower. Additional medium tanks, BM-21 multiple rocket-launchers, and anti-tank guided missiles were added, together with the first tube artillery in the form of the M1974 122-mm self-propelled gun. Before this artillery support was limited to that provided by naval gunfire, plus BM-21 and amphibious ship rocket fire.

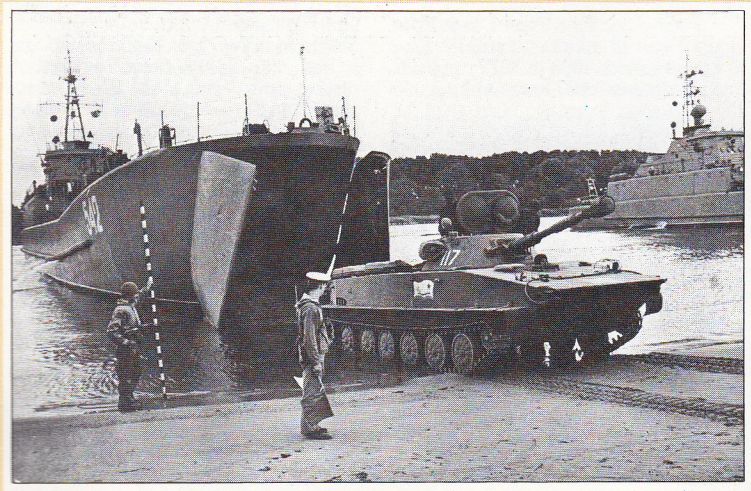
Battalion Assault Force

As with all Soviet forces, the Naval Infantry can be quickly expanded in wartime by the mobilization of trained reserve personnel and stockpiled reserve equipment. The basis of the regiment is the battalion, made up of three infantry companies, a mortar platoon, and supporting supply and maintainance, medical and communications units. When reinforced the battalion constitutes the main amphibious assault unit, the Battalion Assault Force (BAF). The company is divided into a small headquarters unit and three platoons, each of which has three squads carried in BTR-60 APCs. The medium tanks are usually assigned on the basis of one platoon of three tanks to support a naval infantry company. The medium tanks usually disembark in shallow water behind the PT-76 and BTR-60 first or second assault waves. One platoon of medium tanks is believed to be equipped with the flamethrower version of the T-54/55 MBT for reduction of strongpoints.

The primary mission of the Naval Infantry is the amphibious assault. This is divided into several categories depending upon the scale and mission of the landings. The categories are, firstly, strategic landings which are conducted in support of theatre forces to open up a new front of operations (though the Soviets are believed not to have developed this capability as yet and probably will not for the foreseeable future). Secondly, there are operational landings to assist ground or naval forces in coastal areas to surround and destroy enemy ground or naval units, or to capture major objectives within the area (usually a regimental-sized operation). Thirdly, there are tactical landings to strike at the rear or flank of enemy units along a coastline or to capture specific objectives (a battalion- or regimental-sized operation). Fourthly, there are reconnaissance and sabotage landings to reconnoitre areas, to inflict significant material and installation losses, and to create diversions (a battalion-, company- or platoon-sized operation).

The secondary role assigned to the Naval Infantry is to participate in coastal defence operations. However, in practice this is rarely likely to occur as it is a waste of a valuable combat resource.

One unique feature of the operations is the extensive use of amphibious-assault air-cushion vehicles. There are currently four types available. The smallest of these is the 'Gus' class, of which there are some 33 in service with the Baltic, Black Sea and Pacific Fleets. The 'Lebed' class is in service with the Baltic and Pacific Fleets for initial assault and logistic support duties; around 12 are in service with more being built. Both the 'Gus' and the 'Lebed' (in a preloaded state) can be used from the 'Ivan Rogov' class LPD. The largest ACV in use is the 'Aist' class, of which some 13 are in service with the Baltic and Black Sea Fleets. Additional units are under construction, together with the new 'Uterok' class which is the follow-on to the 'Gus' class. Some four 'Uteroks' are currently in service.



In service since 1952, the PT-76 light tank has excellent amphibious qualities. Seen here being loaded onto a 'Polnocny'-class LCT of the Baltic Fleet, the PT-76 provides fire support to the first waves of an assault.

Standard APC of the Soviet Naval Infantry, the BTR-60P has been in use since about 1960. Fully amphibious, it has been produced both with an open top and with an armoured top allowing full NBC protection.

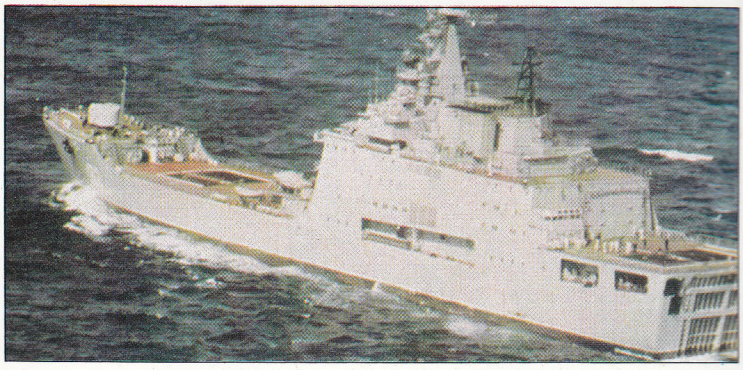
USSR

'Ivan Rogov' Class Amphibious Transport Docks (LPD)

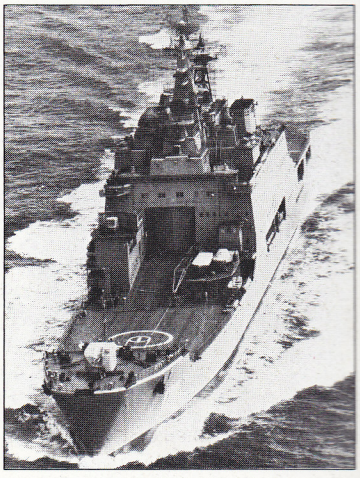
Given the designation *Bol'shoy Desantnyy Korabl'* (BDK) or large landing craft by the Soviets, the *Ivan Rogov* was launched in 1976 at the Kalingrad shipyard. The vessel entered service in 1978 as the largest amphibious warfare ship yet built by the Soviets. A second unit of the **Ivan Rogov** class was laid down in 1979 but has apparently suffered delays in its construction. The vessel is capable of carrying a reinforced Naval Infantry battalion landing team with all its APCs and other vehicles plus 10 PT-76 light amphibious tanks. An alternative load is the tank battalion of the Soviet Naval Infantry regiment. The *Ivan Rogov* is unique in Soviet amphibious ship design as it has both a well dock and a helicopter flightdeck and hangar. This allows the ship to perform not only the traditional role of over-the-beach assault by use of bow doors and ramp, but also the stand-off assault role using a mixture of helicopters, landing craft, air cushion vehicles and amphibious vehicles.

The bow doors and internal ramp position provide access to a vehicle parking deck located in the lower forward part of the ship. Further vehicles can be accommodated in the midships area of the upper deck, access to this being by hydraulically operated ramps that lead from the bow doors and the docking well. The vehicle deck itself leads directly into the floodable well which is some 79 m (259.2 ft) long with a stern door some 13 m (42.6 ft) across. The well can accommodate either two preloaded 'Lebed' class air cushion vehicles (ACV) and a 145-ton full load 'Ondatra' class LCM, or three 'Gus' class ACV assault troop carriers.

Two helicopter landing spots are provided, one forward with its own flight control station, and one aft on a flight deck located above the well deck. This also has its own flight control station. Both spots have access to the massive block superstructure, the forward pad by a ramp leading up to the hanger and the aft by a set of hangar doors. The hangar has sufficient space for up to five Kamov Ka-25 'Hormone-C' utility helicopters to be stowed. It is probable that these will eventually be replaced by the utility version of the new Kamov Ka-32 'Helix' helicopter that is currently entering service with the Soviet navy. Accommodation for the embarked Naval Infantry units is located within the superstructure block itself. Vehicle and helicopter maintenance workshops are also located there. To starboard, immediately in front of the block is a tall deck house on top of which is mounted a navalized version of the Soviet army's 122-mm BM-21 rocket-launcher system. This uses two 20-round packs of launcher tubes, one to each side of a pedestal mounting that trains them in azimuth and elevation. The rockets are used to provide a saturation shore bombardment capability for the assault units. A twin 76-mm DP gun turret is located on the forecastle, whilst a twin rail pop-up SA-N-4 SAM launcher bin unit and four 30-mm CIWS Gatling guns are mounted on top of the main superstructure block to provide air defence. Extensive command, control and surveillance equipment is fitted for amphibious force flagship duties. The *Ivan Rogov* has served with the Baltic and Pacific fleets and it is thought likely that a total of four will be built, permitting one to serve with each of the four fleet commands.

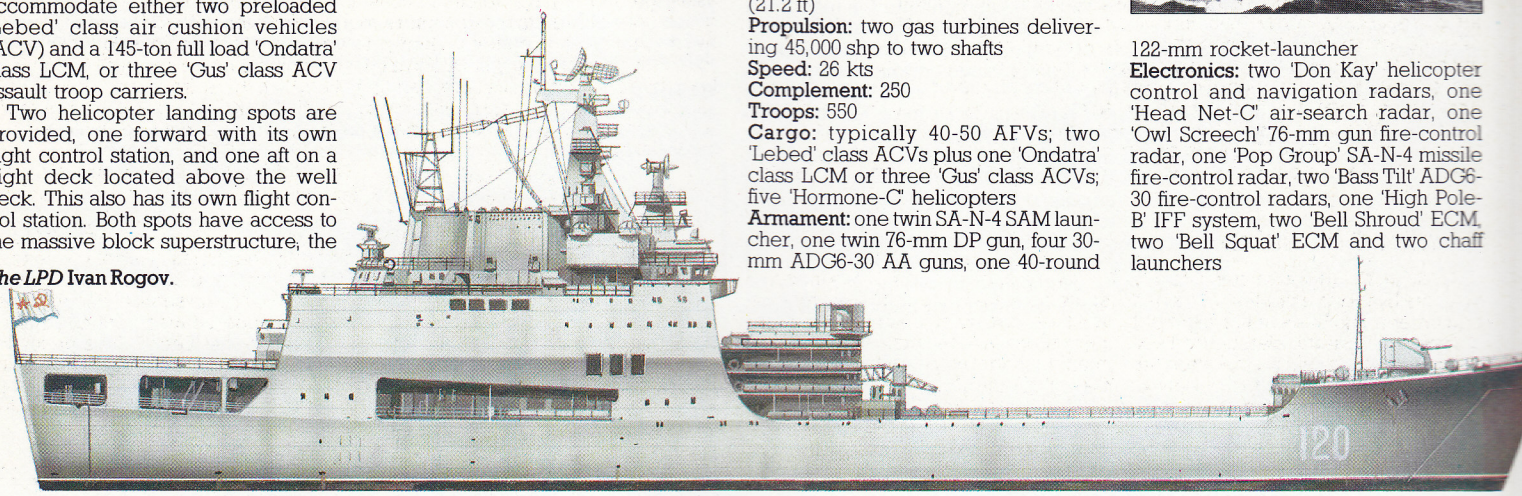


Above: The first Soviet LPD, the Ivan Rogov. *Capable of transporting a reinforced Naval Infantry battalion, the ship also operates four or five 'Hormone-C' helicopters, several air cushion vehicles and an LCM.*



Right: The Ivan Rogov *has been given the Soviet designation* Bol'shoy desantnyy korabl *(large landing ship). In 1982 the second ship of the class,* Aleksandr Nikolaev, *was completed at the naval shipyard in Kalingrad.*

Specification:
Name: *Ivan Rogov* plus three(?) others under construction
Commissioned: 1978
Displacement: 13,000 tons full load
Dimensions: length 159 m (521.6 ft); beam 24.5 m (80.2 ft); draught 6.5 m (21.2 ft)
Propulsion: two gas turbines delivering 45,000 shp to two shafts
Speed: 26 kts
Complement: 250
Troops: 550
Cargo: typically 40-50 AFVs; two 'Lebed' class ACVs plus one 'Ondatra' class LCM or three 'Gus' class ACVs; five 'Hormone-C' helicopters
Armament: one twin SA-N-4 SAM launcher, one twin 76-mm DP gun, four 30-mm ADG6-30 AA guns, one 40-round 122-mm rocket-launcher
Electronics: two 'Don Kay' helicopter control and navigation radars, one 'Head Net-C' air-search radar, one 'Owl Screech' 76-mm gun fire-control radar, one 'Pop Group' SA-N-4 missile fire-control radar, two 'Bass Tilt' ADG6-30 fire-control radars, one 'High Pole-B' IFF system, two 'Bell Shroud' ECM, two 'Bell Squat' ECM and two chaff launchers



The LPD Ivan Rogov.

EAST GERMANY

'Frosch' Class Landing Ships Tank

The **'Frosch I'** class ships are similar but not identical to the Soviet 'Ropucha' class of LST. They are smaller, have a blunter bow shape and are fitted with a bow ramp and a much heavier armament (two twin 57-mm and two twin 30-mm). The 12-ship class was built between 1975 and 1979 to replace the obsolete 'Robbe' and 'Labo' classes of landing ships. The single vehicle deck is capable of transporting some 800 tons of cargo or up to 12 MBTs. There is no roll-on/roll-off capability due to the absence of stern vehicle ramps. Forward, on the empty deck space between the bridge and the forward twin 57-mm mounting, two 122-mm 40-round navalized split BM-21 pedestal rocket-launcher mountings have been fitted for saturation shore-bombardment purposes. The 'Frosch I' may also be used for minelaying, the mines being laid through two stern hatches. The presence of a large number of radio antennae suggests that the vessels can also undertake amphibious operation command and control duties. In 1980 two additional units, designated **'Frosch II'**, were built at the same Peenewerft shipyard at Wolgast that built the 'Frosch I' ships. These differ from the original class in having a 5-ton capacity crane amidships and two large cargo hatches. No rocket-launchers or 30-mm AA guns are carried, although two twin 25-mm AA guns are mounted right forward to cover the beach during a landing. It is thought that these craft act as assault cargo ships during amphibious operations, possibly carrying munitions. The East Germans have no naval infantry but instead have trained a motorized rifle regiment (believed to be the 26th) of three motorized rifle battalions and a tank battalion to act in the amphibious assault role. The East Germans also operate with the Polish army's 7th Sea landing Division of three assault regiments and a tank battalion and a Soviet Naval Infantry regiment during Warsaw Pact amphibious assault exercises in the Baltic.

Specification:
Class number: 12 'Frosch I' and 2 'Frosch II'
Commissioned: 'Frosch I' 1976-79 and 'Frosch II' 1980
Displacement: 'Frosch I' 1,950 tons and 'Frosh II' 2,000 tons full load
Dimensions: length 91 m (298.4 ft); beam 11 m (36.1 ft); draught 2.8 m (9.2 ft)
Propulsion: two diesels powering two shafts
Speed: 16 kts
Complement: 40
Troops: normal 80, for limited time 160
Cargo: 12 MBTs, or 16 AFVs or 600 tons of stores
Armament: two twin 57-mm AA guns, two twin 30-mm AA guns (or two twin 25-mm AA guns in 'Frosch II'), two 40-barrel 122-mm rocket-launchers (none in 'Frosch II'), mine numbers vary according to type carried
Electronics: one 'Strut Curve' air-search radar, one 'Square Head' IFF system, one 'High Pole-B' IFF system, one 'Muff Cob' fire-control radar, one TSR333 navigation radar

The Soviet Amphibious Assault

Soviet amphibious assault tactics are thorough, well-defined and well practised by the Naval Infantry, the organic amphibious forces of the Soviet navy. Their operations fall into five parts. Firstly, there is the preparation of the equipment and units, which are trained to begin operations either when already at sea or from an alert state at their land base. Secondly, when alerted at the shore base the amphibious assault units man their equipment and proceed to the embarkation ports for loading onto ships and transports, which arrive shortly before the assault force units to preclude any bunching of the equipment and personnel. During loading the vehicles are driven on in reverse order so that the assault vehicles disembark first at the landing zone. Thirdly, after loading, the ships form a convoy under the protection of escort vessels and aircraft to protect against any enemy air and sea attacks during the transit voyage to the beach-head designated for the force. During the passage the units' political officers address the troops to build up their fighting spirit, the men check their vehicles, weapons and equipment, and the commanders review their missions and orders. Fourthly, the battle for the beach-head is initiated when the naval gunfire support ships open fire on the defending artillery, positions, troop concentrations and obstacles. The Naval Infantry then lands in assault formation. Fifthly, the landing of follow-up Soviet army ground forces permits the withdrawal of the Naval Infantry and any supporting units.

To illustrate the last two phases a typical Soviet Naval Infantry battalion assault force landing is described below. The force consists of a Naval Infantry battalion, a PT-76 amphibious light tank company, an engineer platoon, a reconnaissance platoon, a mortar platoon, an anti-tank platoon and an air defence platoon of four SA-9 'Gaskin' SAM vehicles. The force is landed to link up with a company of Soviet army airborne troops parachuted behind the coastal defences. Close air support is provided by a squadron of Soviet air force fighter-bombers, whilst naval vessels provide artillery support, ASW, minesweeping and rescue services.

The convoy of assault ships and transports transits to the operational area under cover of darkness whilst observing strict radio silence. Once there they and their escorts deploy into the final assault formation, with the minesweepers conducting clearance operations right up to the beach-head. As dawn breaks the escorts tasked with naval gunfire support and the landing ships fitted with multiple rocket-launchers begin the pre-planned bombardment of the shore defences. Whilst this is in progress the unit commanders review their orders, confirm that the units understand their missions, and order the equipment to be readied for use.

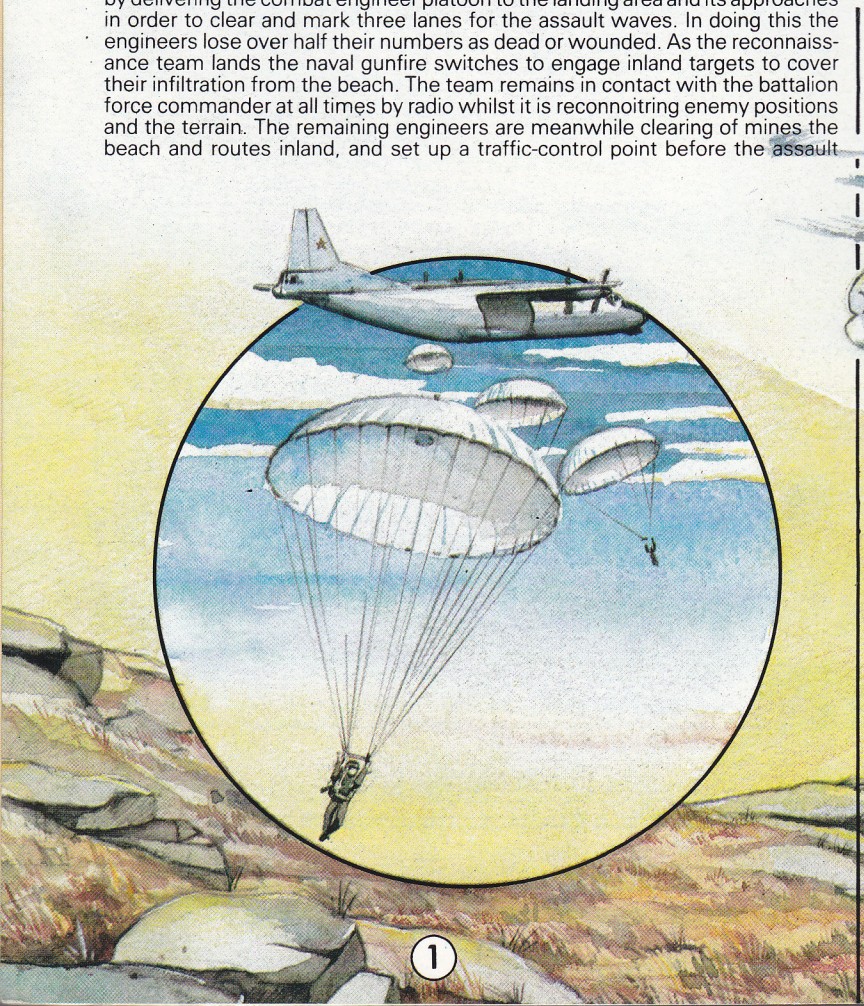
Under cover of the bombardment a flight of Antonov An-12 'Cub' four-engine transports drops the paratroop company and its equipment into the rear of the defences to disrupt lines of communication, to block any approch of reinforcements and to secure several key features of terrain. As the airdrop is in progress the reconnaissance troop of three BRDM-2 amphibious armoured cars and a PT-76 light tank disembark into the surf some 600 m (655 yards) offshore and begin their swim-in to the beach, several Soviet naval air force Kamov Ka-25 'Hormone-C' helicopters and a 'Gus' air-cushion vehicle having paved the way by delivering the combat engineer platoon to the landing area and its approaches in order to clear and mark three lanes for the assault waves. In doing this the engineers lose over half their numbers as dead or wounded. As the reconnaissance team lands the naval gunfire switches to engage inland targets to cover their infiltration from the beach. The team remains in contact with the battalion force commander at all times by radio whilst it is reconnoitring enemy positions and the terrain. The remaining engineers are meanwhile clearing of mines the beach and routes inland, and set up a traffic-control point before the assault waves start to disembark. The squadron of newly-arrived fighter-bombers is directed to attack the defensive positions that have survived the bombardment and to establish combat air patrols over the landing ships and beach-head.

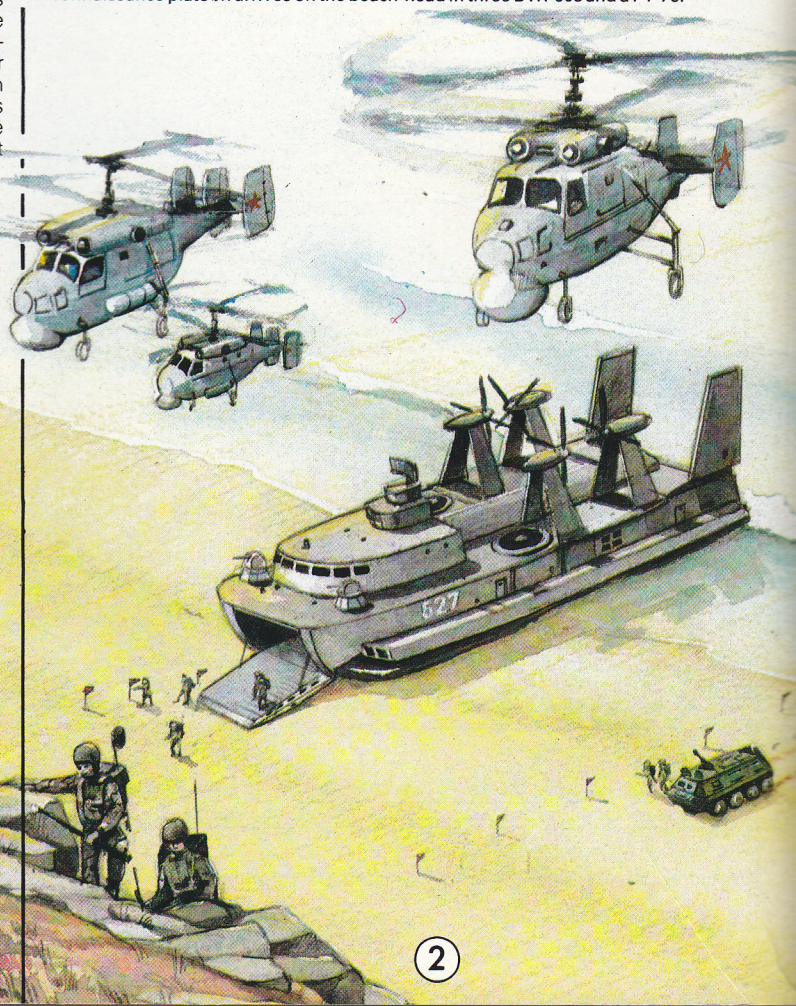
'Aist'-class air cushion vehicles are capable of carrying up to four PT-76 light tanks and 150 naval infantrymen. With a maximum speed of 75 mph (120 km/h), and true amphibious capability, the 'Aist' class is a significant addition to Soviet assault capacity.

The first assault wave of three PT-76s with a company of naval infantry in 10 BTR-60 APCs then disembarks and begins its swim-in to the beach. As they do so the tanks engage several positions, firing at them with their 76-mm main guns, while the BTR-60s fire at any enemy troops and light vehicles they see with their 14.5-mm heavy machine-guns. The force lands without any vehicle

Stage 1
Under cover of ship-to-shore bombardment a flight of Antonov An-12s based on friendly soil drops an advance party of special force paras to disrupt enemy communications, delay defensive reinforcements and secure key terrain features.

Stage 2
Helicopters from landing ships and hovercraft deliver combat engineers ashore to clear mines, obstructions and barriers and mark lanes for the following assault waves. A reconnaissance platoon arrives on the beach-head in three BTR-60s and a PT-76.





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Whilst the first wave attacks inland the second wave lands on its left flank to broaden the beach-head further, the battalion commander personally directing the accompanying support units to set up defensive positions to protect the beach-head and to engage targets as designated by the assault waves. The third and final wave, again configured like the other two, is then launched with the rear service units following behind. This wave is directed by the battalion commander, now ashore with his headquarters group, to land on the right flank of the first wave. Once it achieves this and pushes forward to the same line as the first and second waves, then the whole battalion attacks in line formation to expand and deepen the beach-head to secure it for the follow-up formations. The rear service units which have meanwhile landed set up their resupply and casualty evacuation routes on the beach itself.

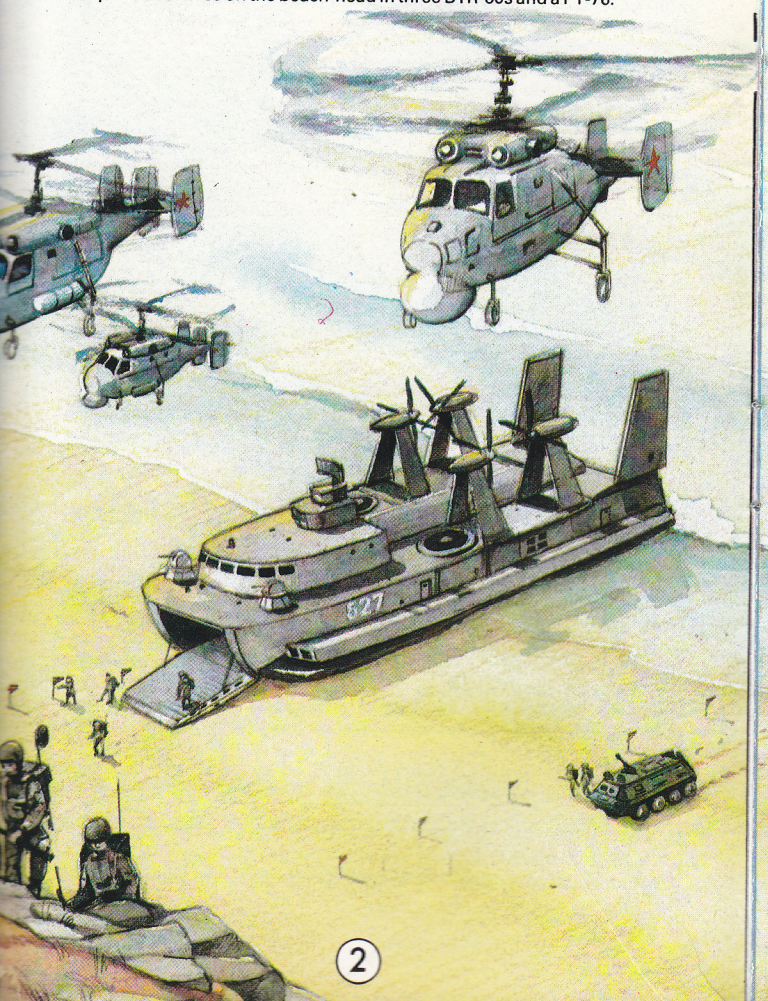
Inland from the beach-head the reconnaissance platoon has met up with elements of the airborne company that is advancing towards it. Once this has happened and the main battalion force is judged to have met its objective by clearing the routes inland, then all the units will wait in place for the follow-up formations of the Soviet army to land and relieve them. These are directed in their tasks and deployment by the beachmaster in order to maintain the direction and momentum of the attack inland. The surviving remnants of both the battalion assault force and the paratroop company are then withdrawn to the landing ships for the return to the home port for re-equipment and regrouping before the next assault.

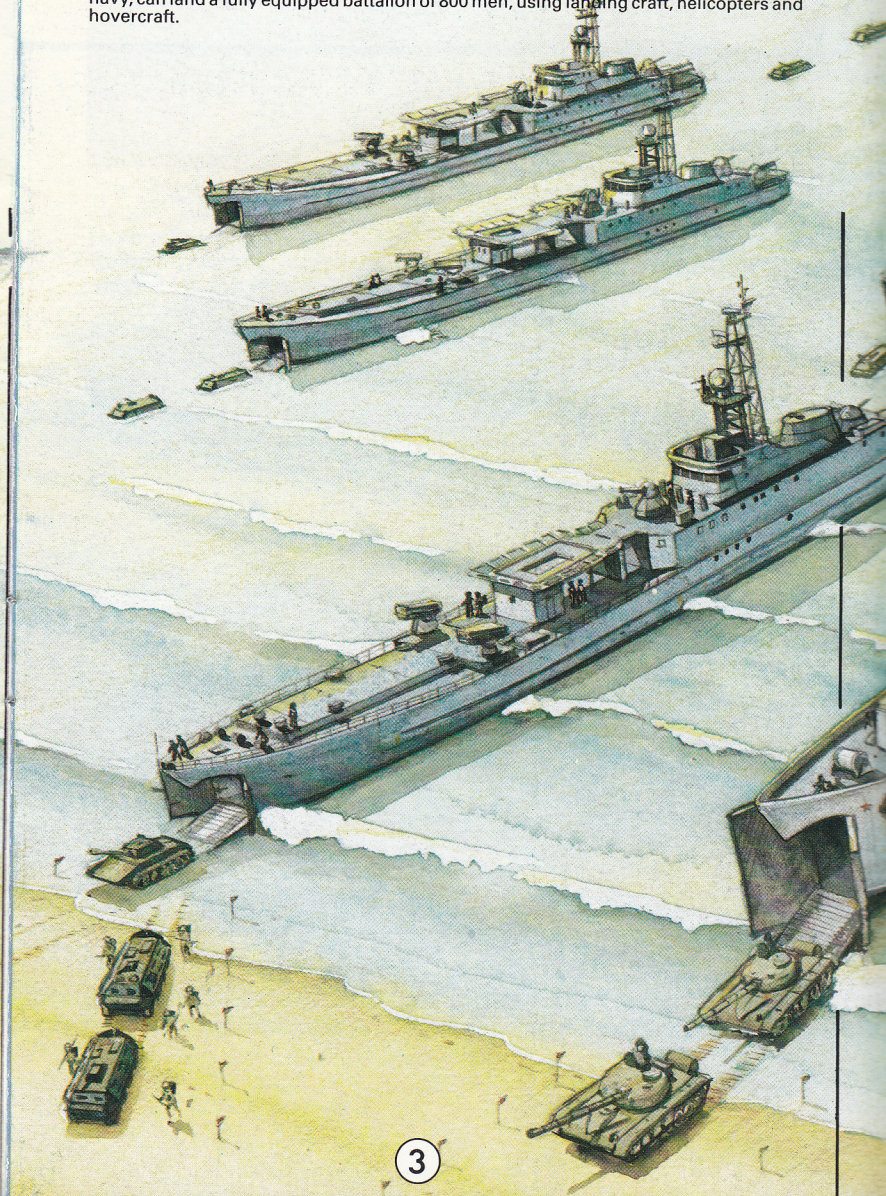
Stage 3

The first assault waves of naval infantry in armoured personnel carriers supported by light tanks are put ashore from several 'Polnocny'-class landing ships, which can use shallow water and can beach well up on the shore.

Stage 4

Larger units begin to discharge heavy equipment including T-72 tanks and follow-up units of the Soviet army to relieve the Naval Infantry. Alligator LSTs (ship 560) are primarily tank landing ships, but the later 'Ropucha' class (ship 116) can carry both equipment and a company of Naval Infantry. *Ivan Rogov* (ship 120), the largest landing ship in the Soviet navy, can land a fully equipped battalion of 800 men, using landing craft, helicopters and hovercraft.





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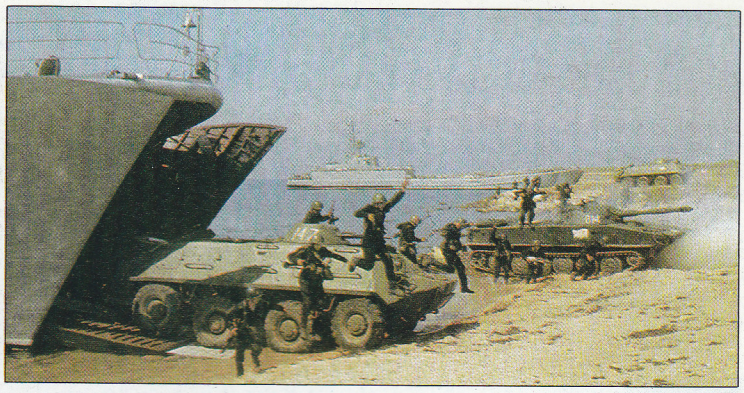
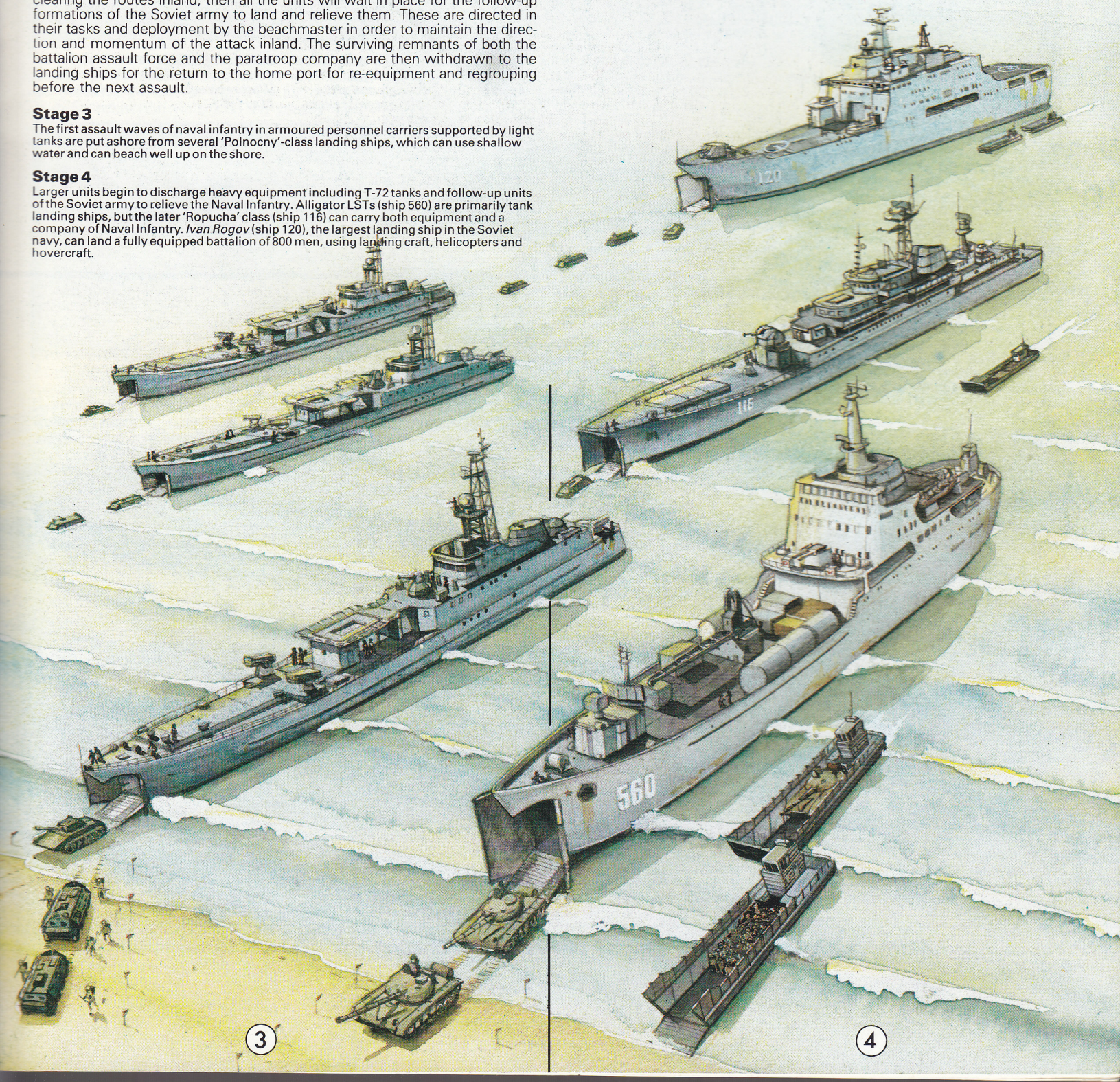


Soviet Naval Infantry coming ashore from 'Polnocny'-class landing ships. With PT-76 light tanks providing covering fire and BTR-60P APCs providing mobility, the Naval Infantry are reputed to be amongst the best troops in the Soviet armed forces.



UK

'Sir Lancelot' and 'Sir Bedivere' Class Landing Ships Logistic (LSL)

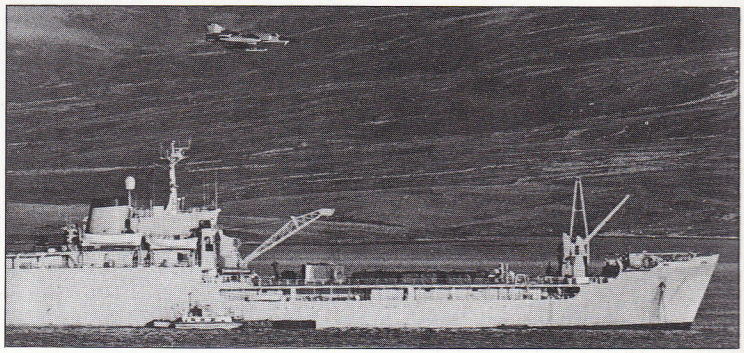
The *Sir Lancelot* was ordered in 1963 as the prototype **'Sir Lancelot'** class ship of an eventual six-ship LST type design for the British army. The remaining five ships were built to a slightly modified design and called the **'Sir Bedivere'** class, all six ships being named after the knights of King Arthur's 'round table'. Since then Australia has built HMAS *Tobruk* to a modified 'Sir Bedivere' design. In 1970 the army ships passed to the control of the Royal Fleet Auxiliary (RFA), which mans them today. During the Falklands war all six ships were used, and both the *Sir Galahad* and *Sir Tristram* were severely damaged by Argentinian bombs at Bluff Cove, the former being subsequently towed out and sunk and the latter being towed back to the UK for repair after use as an accommodation ship at Port Stanley.

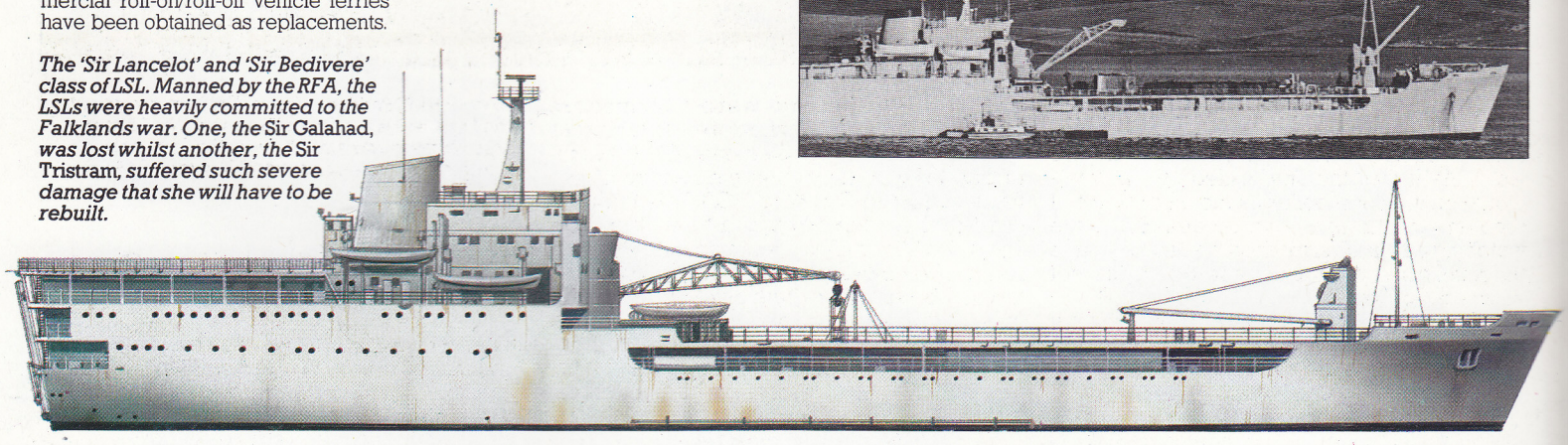
Built into the bow and stern are ramps and doors for a roll-on/roll-off capability and over-the-beach assault facility, whilst interior ramps connect the two cargo decks. Onboard are facilities for vehicle maintenance, and two Mexeflottes can be carried on the hull sides for use as pontoons to ferry troops and vehicles ashore. A helicopter landing platform is located at the stern, with a second pad available on the foredeck. No hangar or maintenance facilities are carried. A replacement for the *Sir Galahad* is to be ordered, whilst in the interim two commercial roll-on/roll-off vehicle ferries have been obtained as replacements.

Specification:
Names: *Sir Lancelot* (L3029), *Sir Bedivere* (L3004), *Sir Geraint* (L3027) and *Sir Percival* (13036)
Commissioned: L3029 16 January 1964, L3004 8 May 1967, L3027 12 July 1967 and L3036 23 March 1968
Displacement: L3029 5,550 tons and rest 5,674 tons full load
Dimensions: length 125.1 m (412.1 ft); beam 19.6 m (59.8 ft); draught 4.3 m (13 ft)
Propulsion: two diesels delivering 9,400 bhp (L3029 9,520 bhp) to two shafts
Speed: 17 kts
Complement: 69 (18 officers and 51 men)
Troops: 340 normal, 534 maximum
Cargo: maximum 18 MBTs and 32 4-ton trucks plus 90 tons of general cargo, 120 tons of petrol, oil and lubricants, and 30 tons of ammunition (L3029 the same except only 16 MBTs and 25 4-ton trucks); two Mexeflottes; three Westland Wessex HU.Mk 5 or two Westland Sea King HC.Mk 4 or three Aérospatiale Gazelle or Westland Lynx helicopters
Armament: two Mk 9 40-mm AA guns plus variable number of 7.62-mm (0.3-in) GPMGs and Blowpipe hand-held SAM launchers (normally no armament is carried)
Electronics: one Type 1006 navigation radar

Above: HMS Fearless *and the LSL* Sir Tristram *undergoing alongside refuelling at speed from one of the RFA's old 'Leaf'-class support ships.*

Below: The LSL Sir Bedivere *under air attack in 'Bomb Alley' (San Carlos Water) by an Argentine Dagger in May 1982.*





The 'Sir Lancelot' and 'Sir Bedivere' class of LSL. Manned by the RFA, the LSLs were heavily committed to the Falklands war. One, the* Sir Galahad, *was lost whilst another, the* Sir Tristram, *suffered such severe damage that she will have to be rebuilt.

UK

'Fearless' Class Amphibious Transport Dock (LPD)

The two British LPDs, *Fearless* and *Intrepid*, are under the command of Flag Officer Third Flotilla (FOF3) who is concerned with the larger warships of the Royal Navy and the naval air elements. The infamous 1981 Defence Review forecast the disposal of *Intrepid* (L11) in 1982 and of *Fearless* (L10) in 1984, but sanity finally prevailed within the Ministry of Defence in February 1982, and it was decided that both ships would continue in service, their worth later being proved during the Falkland Islands war, since without them there could not have been an assault landing to recapture the islands.

The **'Fearless'** class ships are tasked to provide amphibious assault lift capabilities using an onboard naval assault group/brigade headquarters unit with a fully equipped assault operations room from which the force commanders can mount and control all the air, sea and land force assets required for the operation. The ships also carry an amphibious detachment that consists of an assault squadron subdivided into a landing craft (LC) squadron with four LCUs (ex-LCM9s) and four LCVPs, an amphibious beach unit (ABU) with its own Land Rover and a Centurion Beach Armoured Recovery Vehicle (BARV) to attend to stranded vehicles and landing craft, and a vehicle deck party (VDP) for marshalling vehicles for embarkation on the landing craft. An LCU can carry either one Chieftain or two Centurion MBTs, or four 4-ton trucks or eight Land Rovers and trailers, or 100 tons of cargo, or 250 troops as its payload. The LCVP carries either 35 troops or two Land Rovers.

A 50.29-m (165-ft) by 22.86-m (75-ft) flight deck is built over the well deck and is capable of operating most NATO helicopter types or, if required, BAe Sea Harrier VTOL fighter aircraft. Three vehicle decks are provided, in the form of one for tracked vehicles such as tanks or self-propelled guns, one for wheeled trucks, and a half-deck that is reserved for Land Rover vehicles and trailers. The overload troop capacity is sufficient for a light infantry battalion or Royal Marine Commando with an attached artillery battery. Further light vehicle stowage space can be obtained by using the helicopter flight deck. The vessels can also act as training ships, in which 150 midshipmen and naval cadets can be embarked for nine-week courses.

Specification:
Names: *Fearless* (L10) and *Intrepid* (L11)
Commissioned: L10 25 November 1965 and L11 11 March 1967
Displacement: 12,210 tons full load
Dimensions: length 158.5 m (520 ft); beam 24.4 m (80 ft); draught 6.2 m (20.5 ft)
Propulsion: two geared steam turbines delivering 22,000 shp to two shafts
Speed: 21 kts
Complement: 617 (37 officers, 500 ratings and 80 Royal Marines)
Troops: 330 normal, 500 overload and 670 maximum
Cargo: maximum 20 MBT, one BARV, 45 4-ton trucks with 50 tons of stores, or up to 2,100 tons of stores; four LCUs and four LCVPs; five Westland Wessex HU.Mk 5 or four Westland Sea King HC.Mk 4 plus three Aérospatiale Gazelle or Westland Lynx helicopters
Armament: four GWS20 Quadruple Sea Cat SAM launchers, two Mk 9 40-mm AA guns plus variable number of 7.62-mm (0.3-in) GPMGs and Blowpipe hand-held SAM launchers
Electronics: one Type 978 navigation radar, one type 994 air- and surface-search radar, one SCOT satellite communications system, one ESM system with Knebworth/Corvus chaff-launchers, one CAAIS operations room command and control system

Fearless in Action: Battle for the Falklands

HMS *Fearless* is not a particularly attractive ship. Being an assault support ship she has no particular reason to have attractive lines, but the angular appearance of the vessel's high forward superstructure and the long, low helicopter landing deck are highly functional. The blunt stern hides the fact that she has an internal landing craft 'hangar', and the relatively broad hull hides the large numbers of stores, accommodation decks, workshops, offices and communications centres that an assault ship requires in action. Apart from all these facilities *Fearless* has to find room for her ship's complement of 580 men, and additional volume has to be found for her helicopters, aircrew and maintainers, to say nothing of the 380-400 Royal Marines who regard the ship as home.

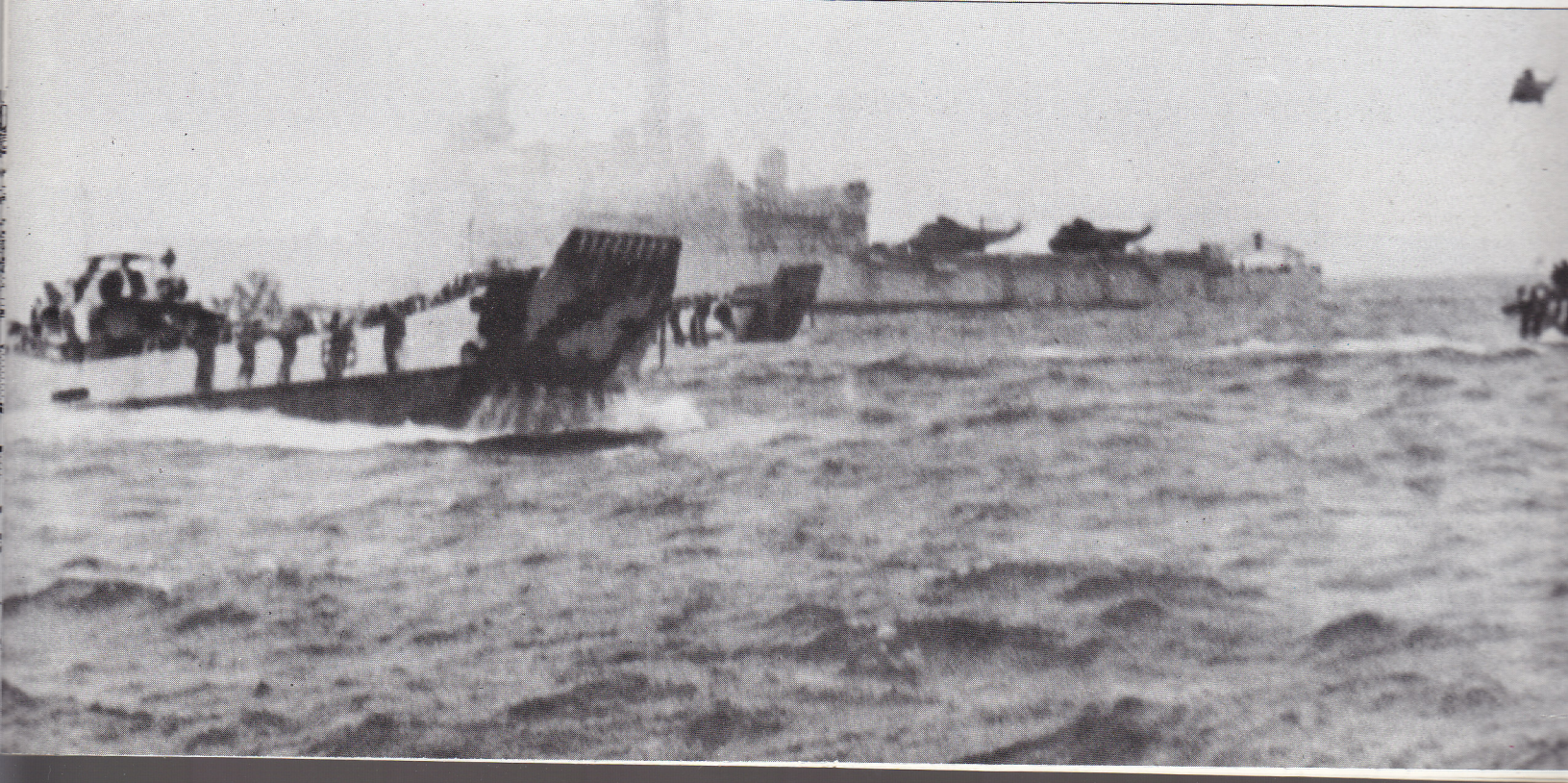
Fearless was completed in 1965 and spent many years providing amphibious operations support in all parts of the world, but increasingly in Scandinavian waters as the years rolled by. However, the operating expense of *Fearless* grew even higher as general costs rose and items of equipment started to wear out until in 1981 she was earmarked for laying-off in 1984; but strings were pulled in high places and *Fearless* was reprieved. Thus in early 1982 *Fearless* was tied up at her usual wharf in Portsmouth Dockyard undergoing an extensive refit and refurbishing programme on all parts of the ship.

Events in the South Atlantic changed all that overnight. The dockyard 'maties' worked immensely long hours to put *Fearless* back into commission, and they achieved virtual miracles as the ship was due to sail on Tuesday 6 April. As it was the ship sailed out of Portsmouth on only one boiler as the other was still recovering from extensive repairs. But to the watching public all appeared well as they gave the small convoy a rousing send-off into the wet mist of the Solent.

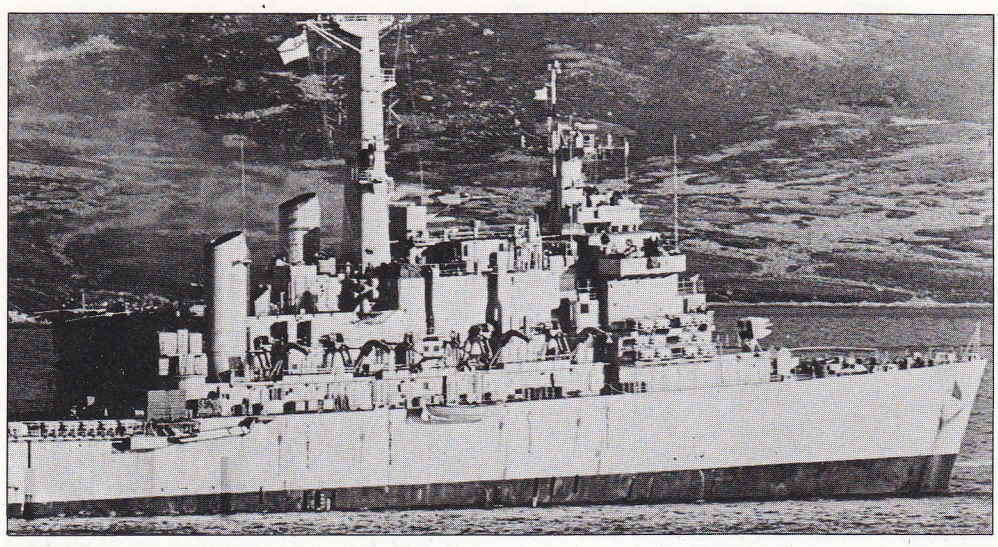
At that stage *Fearless* was still relatively empty apart from the usual mountain of stores packed into all parts of the ship, including the gangways. On board were Commodore Michael Clapp (Commodore Amphibious Warfare), his staff and elements of No. 3 Commando Brigade (including the headquarters), three Westland Sea King HC.Mk 4s from No. 846 Naval Air Squadron and three Westland Scout AH.Mk 1s of No. 3 Commando Brigade. As *Fearless* moved south to Ascension Island the ship's company gradually sorted out the state of the ship and tried to establish where everything had been stacked. The Commandos carried out as much training as they could,

***Above:** HMS* Fearless *signals HMS* Antrim *prior to the San Carlos landings. The run to the Falkland Sound was made at night, with the first troops landing at San Carlos at 04.00 hours on 21 May 1982.*

***Below:** The dawn landing at San Carlos. The four LCUs seen are from HMS* Fearless, *which is 'docked down' in the background for unloading assault craft. On her helicopter deck and in the air are three Westland HC.Mk 4 Sea King assault helicopters used by No. 846 Sqn, Fleet Air Arm.*



Fearless in Action



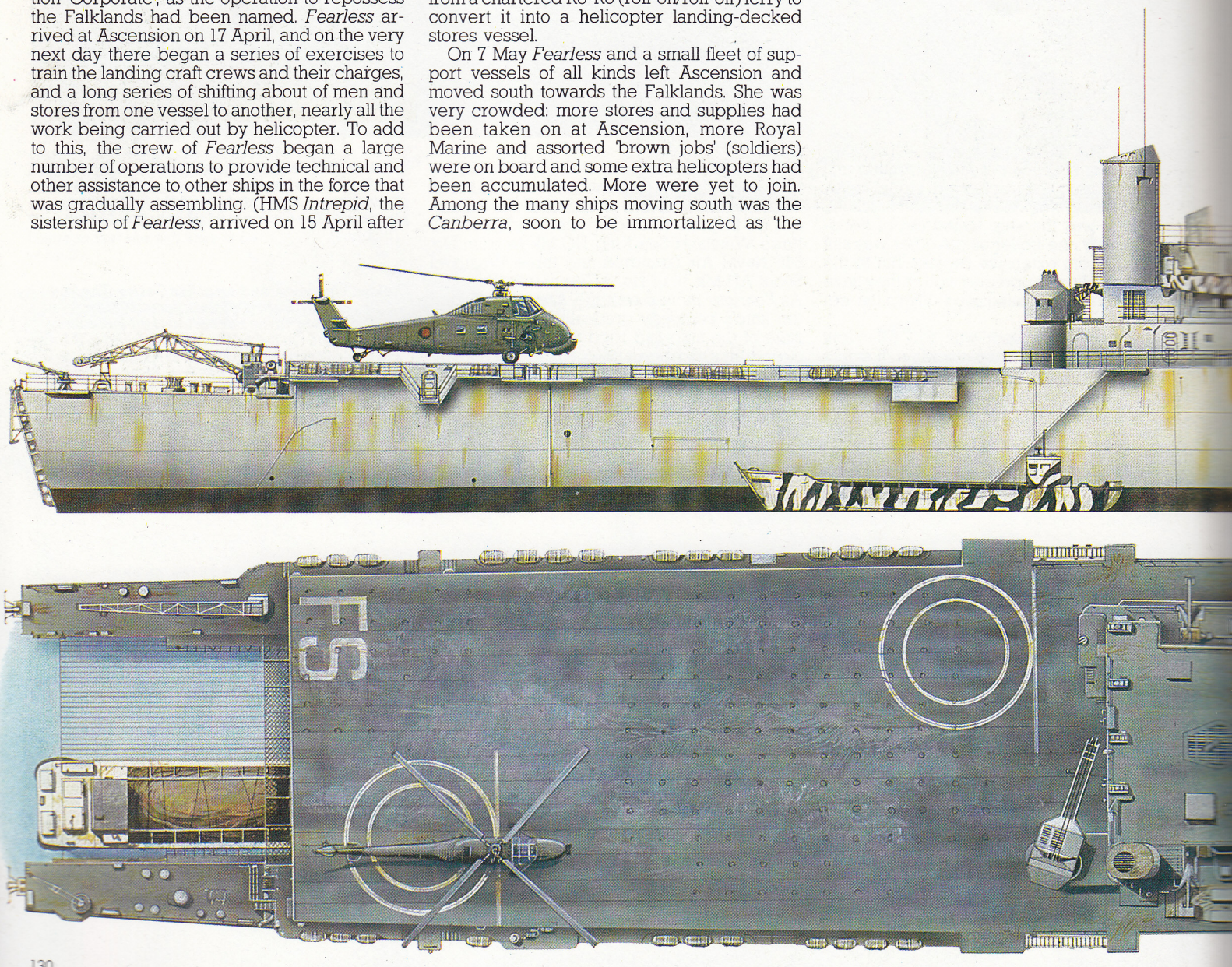
One of the LPDs, HMS Fearless *or HMS* Intrepid, *under attack by an Argentine Dagger in San Carlos Water. The camouflaged aircraft can be seen passing just in front of the mainmast and almost at bridge level.*

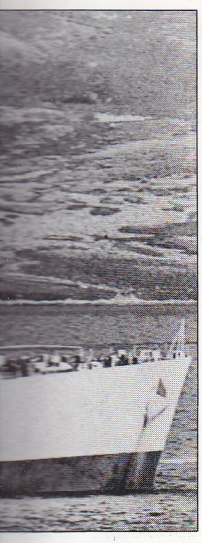
and life was busy as Ascension loomed on the horizon.

At Ascension things grew even busier. From the moment *Fearless* arrived she assumed a role that was to continue until the end of Operation 'Corporate', as the operation to repossess the Falklands had been named. *Fearless* arrived at Ascension on 17 April, and on the very next day there began a series of exercises to train the landing craft crews and their charges, and a long series of shifting about of men and stores from one vessel to another, nearly all the work being carried out by helicopter. To add to this, the crew of *Fearless* began a large number of operations to provide technical and other assistance to other ships in the force that was gradually assembling. (HMS *Intrepid*, the sistership of *Fearless*, arrived on 15 April after an even more involved dockyard operation than that needed by *Fearless*.) Technicians from *Fearless* were transported around the fleet carrying out all manner of tasks from electrical repairs to removing the deck side-walls from a chartered Ro-Ro (roll-on/roll-off) ferry to convert it into a helicopter landing-decked stores vessel.

On 7 May *Fearless* and a small fleet of support vessels of all kinds left Ascension and moved south towards the Falklands. She was very crowded: more stores and supplies had been taken on at Ascension, more Royal Marine and assorted 'brown jobs' (soldiers) were on board and some extra helicopters had been accumulated. More were yet to join. Among the many ships moving south was the *Canberra*, soon to be immortalized as 'the Great White Whale', and from her *Fearless* took on board the 600 or more men of No. 40 Commando plus all their kit and another heap of stores and equipment. This brought the onboard total to well over 1,500 men, who had to sleep and live where and how they could. Each mess, gangway, odd corner and cubby-hole was crammed with men and equipment, but somehow they managed to live without too much in the way of problems.

That was on 19 May, by which time *Fearless* was in good company. Sailing with her were the *Canberra*, the ill-fated *Atlantic Conveyor*, the *Europic Ferry*, the *Elk*, the RFA *Stromness*, the *Intrepid*, and as escorts there were HMS *Ardent* and HMS *Argonaut*. *Fearless* was one of the central vessels of this small fleet, for it was on board that most of the expedition's commanders were based. It was on board *Fearless* that the assault commanders learned of their projected landing beach at San Carlos (that was on 10 May). The landing operations (Operation





One of the LPDs, HMS* Fearless *or HMS* Intrepid, *under attack by an Argentine Dagger in San Carlos Water. The camouflaged aircraft can be seen passing just in front of the mainmast and almost at bridge level.

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***Right and below: Each of the fo
the well deck of HMS* Fearless
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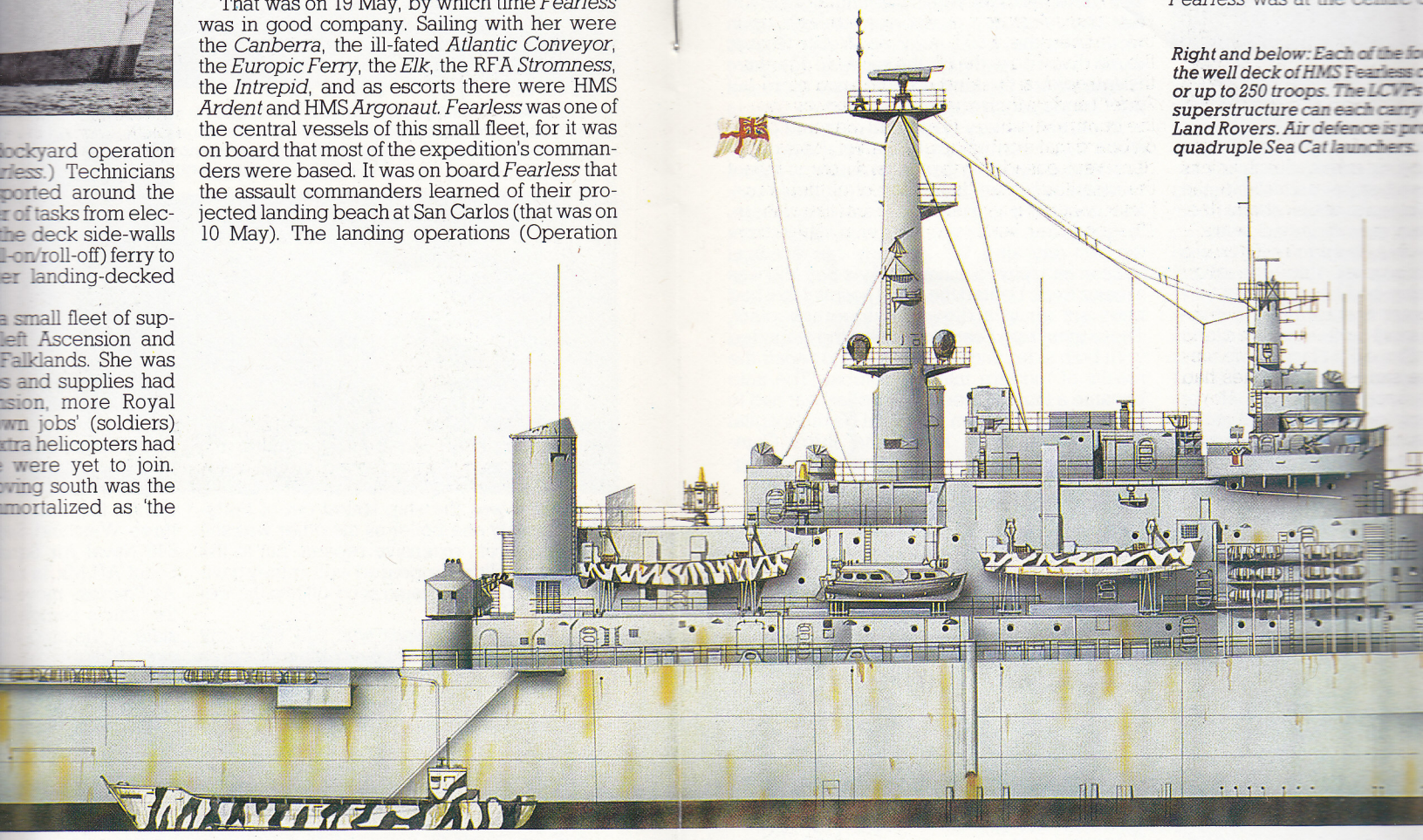

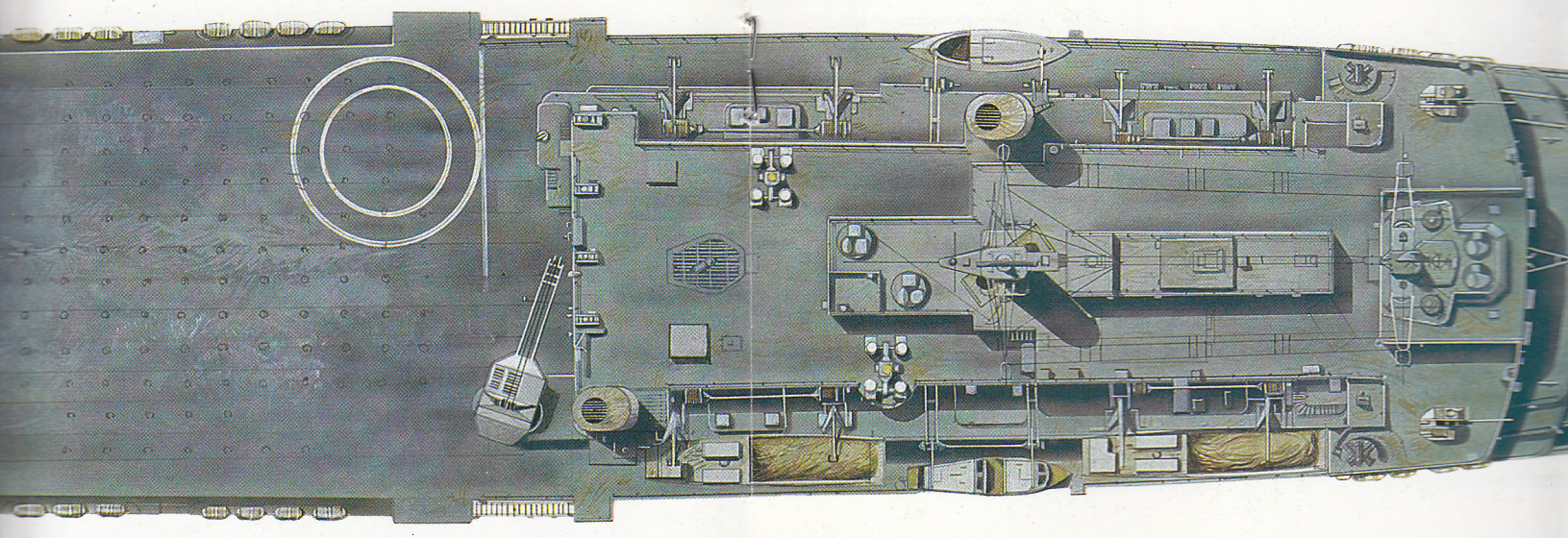

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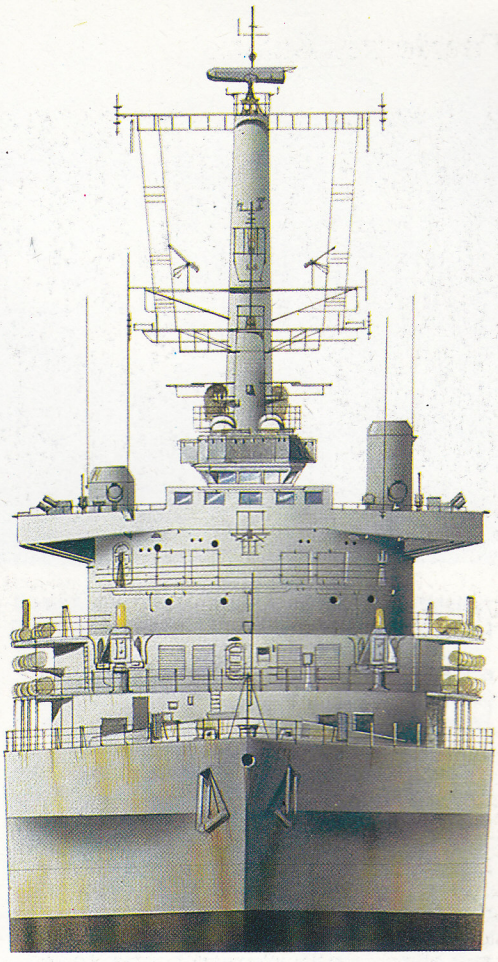
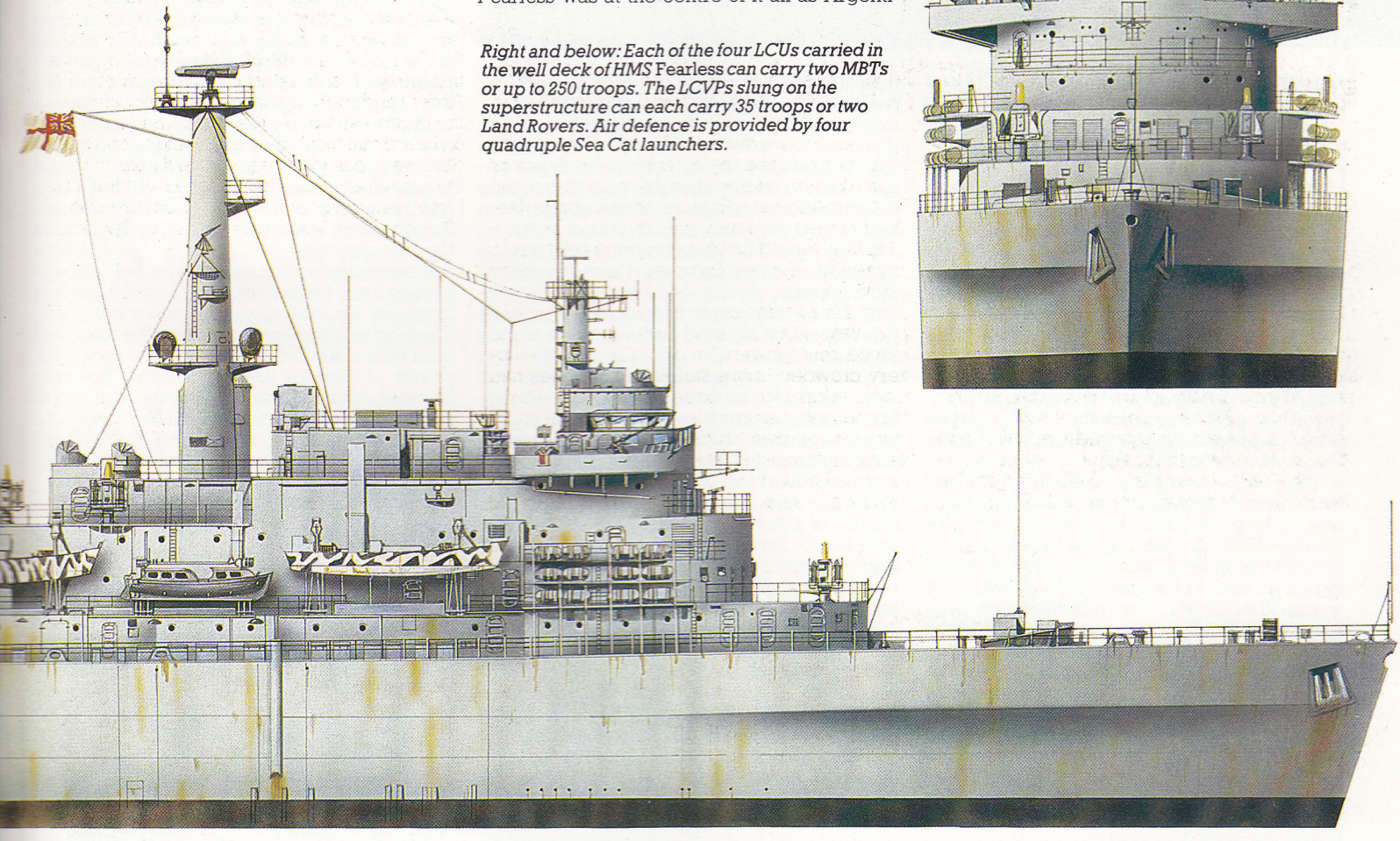
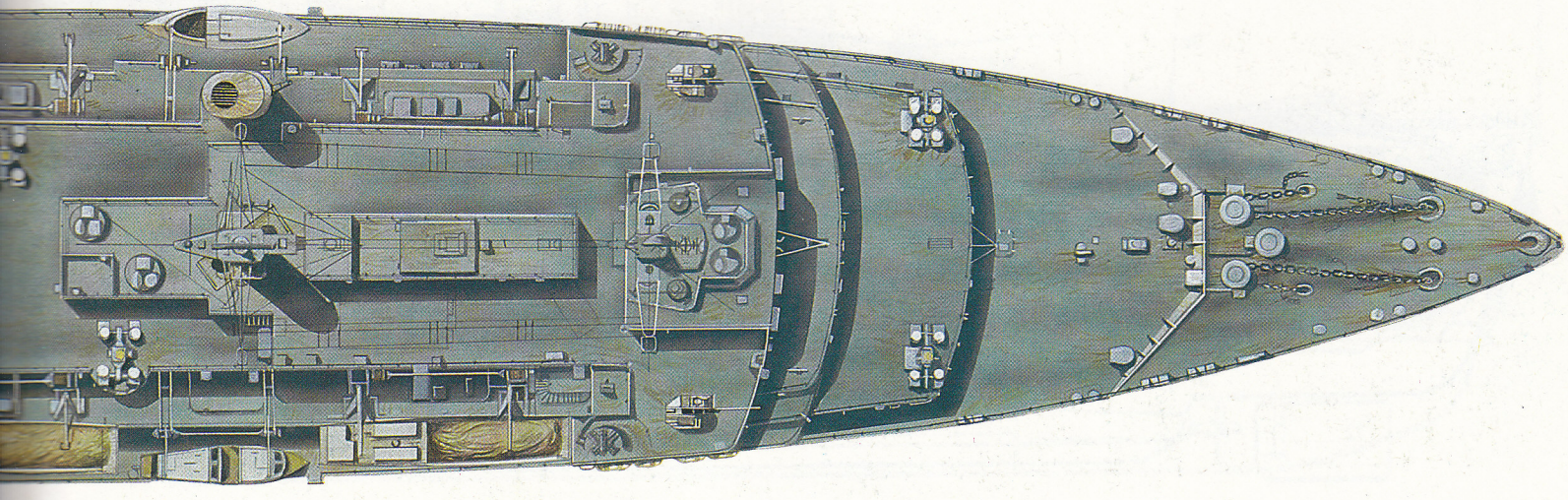
As this force approached San Carlos Water it was spotted by a lone Argentinian air force BAC Canberra, but by then it was too late. *Fearless* started her war work with a vengeance: using the four landing craft carried in the stern, No. 40 Commando started to move ashore. The landing craft carried out the first full-scale amphibious landing in earnest for many years on the night of 21 May, and all went well. The landings went largely unopposed, as a result mainly of a small-scale operation against Argentinian units on Pebble Island. Carried out on 14 May, this operation was a model of combined operations as naval gunfire backed up a Special Air Services raid that destroyed aircraft and the vital warning radar installed on the island.

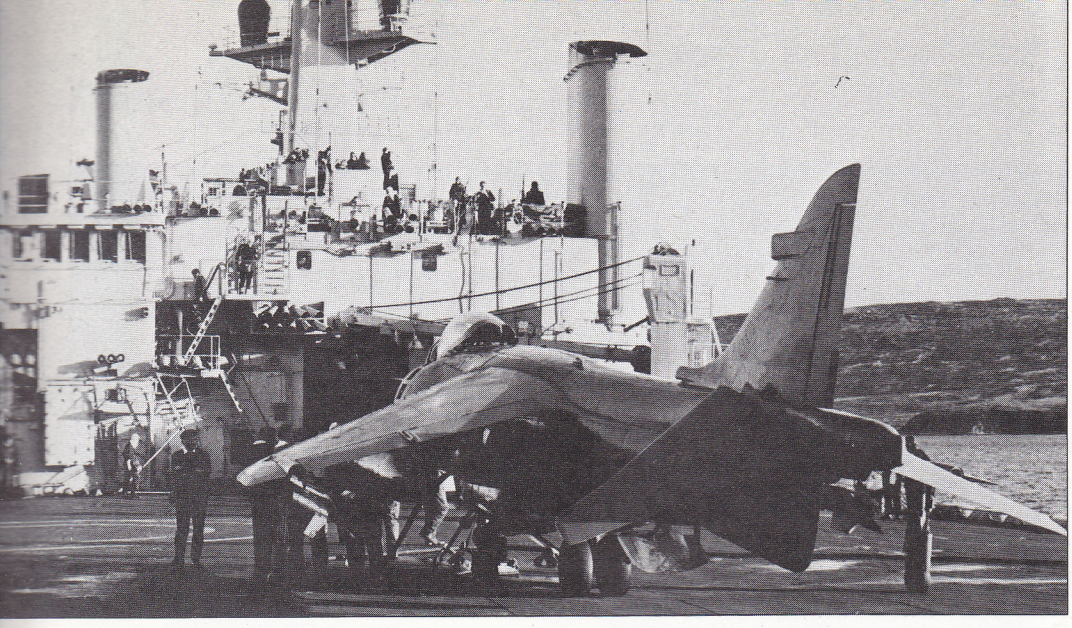
The very next day the air attacks started. *Fearless* was at the centre of it all as Argenti-



Right and below: Each of the four LCUs carried in the well deck of HMS Fearless *can carry two MBTs or up to 250 troops. The LCVPs slung on the superstructure can each carry 35 troops or two Land Rovers. Air defence is provided by four quadruple Sea Cat launchers.*







After the initial landing at San Carlos the helicopter deck of HMS Intrepid *was used on several occasions as a diversionary landing pad and forward operating base for BAe Sea Harrier FRS.Mk 1 fighters from the carriers HMS* Hermes *and HMS* Invincible.

nian air force Dassault Mirages and McDonnell Douglas Skyhawks swung into action. *Fearless* was an obvious target, but somehow she managed to escape the worst. Bombs fell close by, but the ship's defences of two 40 mm L/60 Bofors guns (dating from World War II) and four Sea Cat missile-launchers added their bit to the wall of defensive fire that greeted the attackers. Coming in low and relatively straight, the Argentinians presented good, if fast, targets and they suffered accordingly. That first day's tally was 17 Argentinian air force aircraft shot down, and from then on San Carlos Water became known as 'Death Alley' to the attackers, but they kept coming back with a degree of courage which defies description. On the debit side for the British was the loss of HMS *Ardent*, so for the British San Carlos Water became 'Bomb Alley'.

There were no air attacks on 22 May. *Fearless* concentrated on getting men and stores ashore to consolidate the beach-head. Her landing craft fussed around the Water carrying men and supplies from ship to ship and working for as long as the light held. The next day was another matter. The Argentinian air force returned in strength; this time the attackers hit and destroyed HMS *Antelope*. Before the spectacular explosion that made such photographic history took place, the little landing craft from *Fearless* were able to take off nearly all her crew and that night *Fearless* provided a place of rest for the homeless 'Antelopes'.

On 24 May the air attacks continued and *Fearless* received three casualties, the only ones of her whole campaign: three men on a Bofors gun were wounded by shrapnel and one had to be taken ashore for treatment. Below decks things were as busy as ever, the men involved having little or no idea of what was going on above decks. They had to keep working in the engine rooms, communications centres, landing craft well, stores and all the many other hidden workplaces while above them bombs dropped and guns thumped away.

It was on 24 May that *Fearless* really started her 'mother' role in earnest. From the start of the campaign the ship had been loaning technicians and manpower to other ships, but now *Fearless* started to send battle damage parties to stricken ships. The LSL *Sir Lancelot* was struck by two unexploded bombs (UXB) and the crew had to be removed. As they left parties from *Fearless* moved in. Electrical cables were replaced, temporary repairs brought back lighting and power, new galley equipment was fitted and once the bombs had been rendered safe the crew returned. This was typical of other *Fearless* support operations after bomb damage: a party from *Fearless* carried out extensive repairs to *Argonaut* after a raid; during June a further *Fearless* party assisted in putting out fires on HMS *Plymouth* and clearing a path to unexploded bombs; repair work was carried out on the *Nordic Ferry* and the tug *Irishman*; and so it went on.

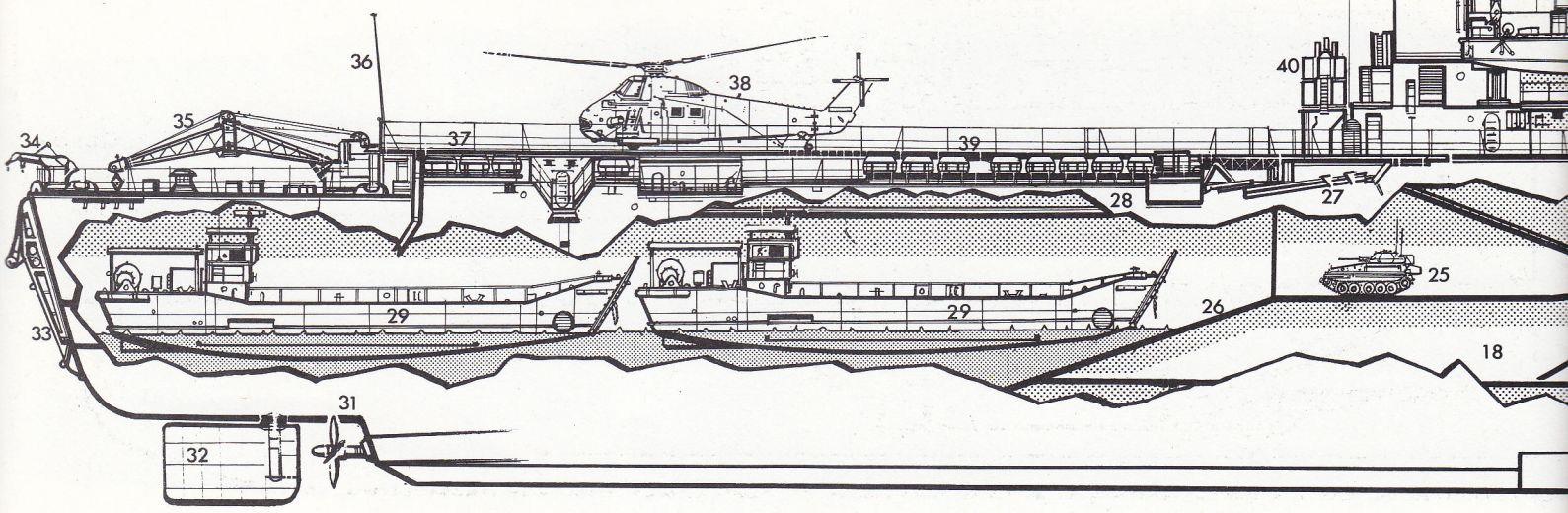
Perhaps the saddest task that men from *Fearless* had to perform was on 11 June. Using a Boeing Vertol Chinook helicopter this party had to survey the wreck of the *Sir Tristram*, damaged severely during the Bluff Cove operation. Despite the severe damage from fire the vessel was repaired to the extent that it could be used for much-needed troop accommodation once the islands had been repossessed.

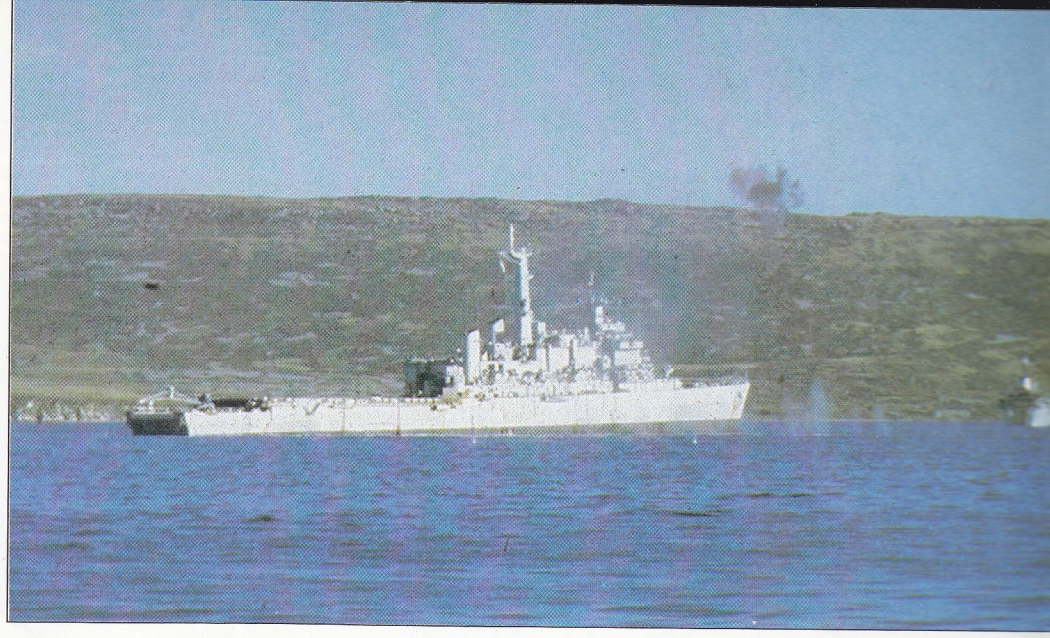
Fearless did not remain in San Carlos Water throughout all the air attacks. On 28 May she was out at sea ready to take on Major General Moore and his staff along with Brigadier Wilson (commander of the 5th Infantry Brigade, the main army force for the final land operations). They were all back in 'Bomb Alley' next day, and there *Fearless* remained until 6 June. On that day *Fearless*'s manpower strength again went over the 1,500 mark as Welsh Guards came aboard ready for the move to Elephant Island, where the landing craft once more put the Guards ashore.

In purely military terms that was one of the ship's last contributions to the retaking of the Falkland Islands. In practical terms it meant business as before. In her role of 'mother' *Fearless* continued to support operations ashore, though in one sense she had been ashore from the first day after the landings: her Medical Section had moved ashore at Ajax Bay and was a major force behind the small hospital that had been set up in a disused refrigerator plant. There men from *Fearless* tended the wounded from both sides and did their best to repair the results of modern infantry combat. The ship became a fount of medical supplies that had to come all the way from the Royal Naval Hospital at Haslar. Back on board the ship's Communications Group handled thousands of sig-

HMS Fearless cutaway drawing key

1 Navigation radar
2 Air search radar
3 Main mast structure
4 Fore funnel (behind main mast)
5 Chute
6 Radar control room
7 Operations room
8 Main bridge
9 40-mm/70 Bofors gun
10 Bridge house
11 Fore mast structure
12 Liferafts
13 Quad mount Sea-Cat surface-to-air missile
14 Anchor
15 Troop deck/stores (1)
16 Troop deck/stores (2)
17 Troop deck/stores (3)
18 Light lorries deck
19 Tank deck





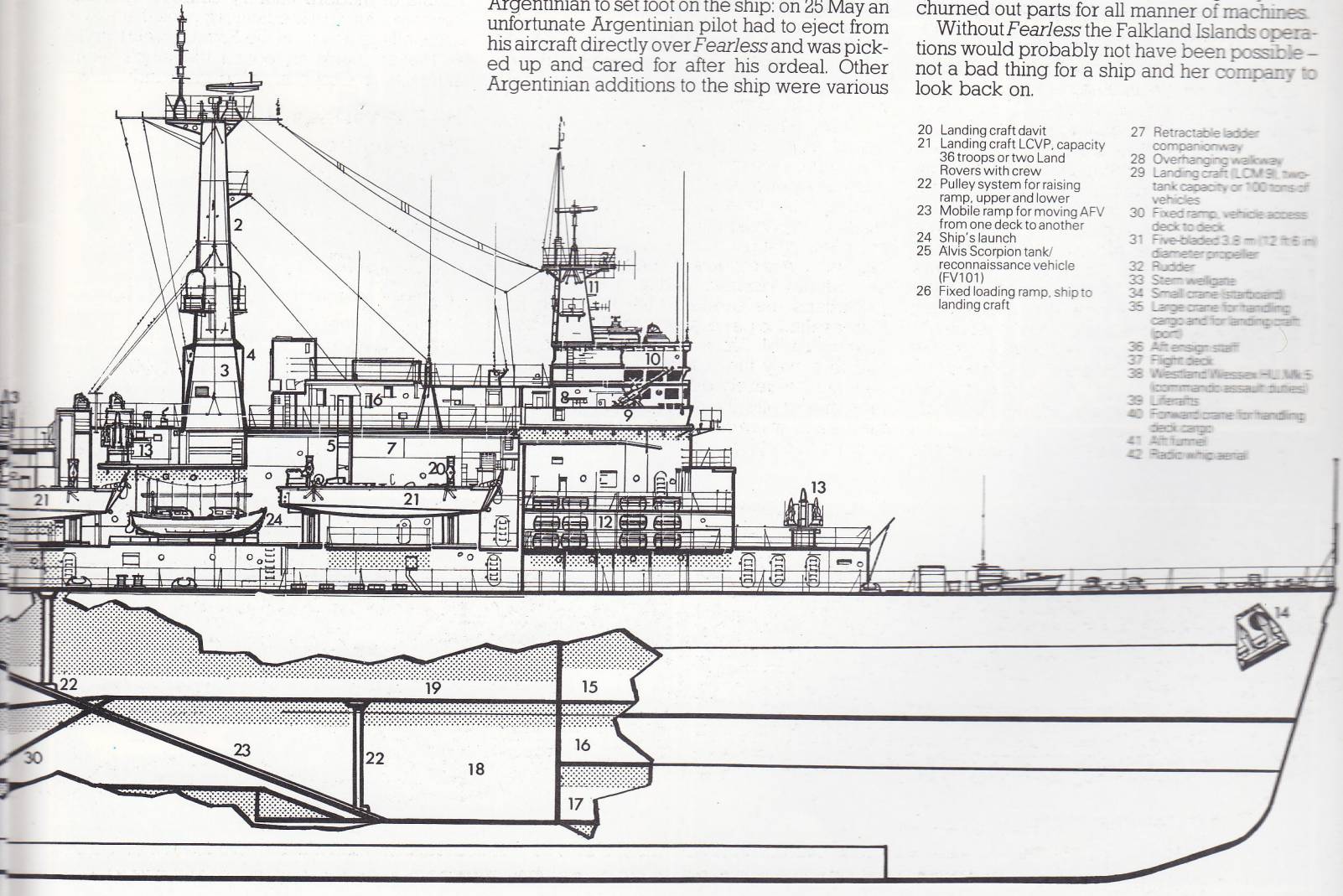
HMS Fearless *under aerial attack at San Carlos. Note what appear to be near misses in the water around the ship either from aircraft cannon fire or 'friendly' anti-aircraft fire.*

nals and wore out a copying machine in the process. The ship's resident helicopters were constantly at work: when they were not carrying men ashore or from ship to ship, they were carrying stores, ammunition and fuel. No. 846 Naval Air Squadron operated from shore bases once in the Falklands, but frequently had to return for repairs and rest. Including No. 846 Squadron's operations, *Fearless*'s helicopter deck logged no fewer than 5,000 landings by the time she sailed from Port Stanley. The ship's meteorological men constantly compiled and delivered weather reports and forecasts for the Task Force. Her one-man photographic department carried out the hundred-and-one tasks that were required, somehow managing to take no fewer than 9,404 photographs. The Supply and Secretarial Department somehow managed to keep everyone fed, even when mess halls were covered in weary soldiers; it also managed to keep tabs on all the supplies moved or consumed (7,474 tons of diesel oil, 573 tons of AVCAT, 14,088 tons of water produced by the ship's condensers, some of it for use by other ships, etc). Over £140,000 in cheques were cashed and £60,000 was handed over to the army ashore for its needs. The list of such deeds is endless but the men of the ship's laundry should not be forgotten. Eight Chinese not only did all the laundry (for over 1,000 men) but also managed to cut hair and do some tailoring!

It is not possible to mention all the sections of the ship. All were busy and all worked long and hard hours to supply the needs of the thousand-and-one customers who looked to *Fearless* for support. Once Port Stanley had been retaken *Fearless* was still busy assisting in the clearing-up operations ashore and even taking over an ex-Argentinian tender. There was one moment of quiet triumph when General Menendez was taken aboard on 15 June, but he was not the first Argentinian to set foot on the ship: on 25 May an unfortunate Argentinian pilot had to eject from his aircraft directly over *Fearless* and was picked up and cared for after his ordeal. Other Argentinian additions to the ship were various 20-mm and 35-mm anti-aircraft guns captured ashore and gladly pressed into use at various points around the decks.

On 25 June *Fearless* left the Falklands and sailed north. It had not been a bad effort from a ship that had once been almost assigned to the scrap-heap. For long and dangerous days she had been in the thick of it all, with bombs falling everywhere around her. Her gunners had scored some kills and many men had been accommodated in her metal interior. Her helicopters had kept men and supplies flowing in all directions. Her damage parties had kept ships afloat and her engineering bays had churned out parts for all manner of machines.

Without *Fearless* the Falkland Islands operations would probably not have been possible – not a bad thing for a ship and her company to look back on.



20 Landing craft davit
21 Landing craft LCVP, capacity 36 troops or two Land Rovers with crew
22 Pulley system for raising ramp, upper and lower
23 Mobile ramp for moving AFV from one deck to another
24 Ship's launch
25 Alvis Scorpion tank/ reconnaissance vehicle (FV101)
26 Fixed loading ramp, ship to landing craft
27 Retractable ladder companionway
28 Overhanging walkway
29 Landing craft (LCM 9) two-tank capacity or 100 tons of vehicles
30 Fixed ramp, vehicle access deck to deck
31 Five-bladed 3.8 m (12 ft 6 in) diameter propeller
32 Rudder
33 Stern wellgate
34 Small crane (starboard)
35 Large crane for handling cargo and for landing craft (port)
36 Aft ensign staff
37 Flight deck
38 Westland Wessex HU Mk 5 (commando assault duties)
39 Liferafts
40 Forward crane for handling deck cargo
41 Aft funnel
42 Radio whip aerial

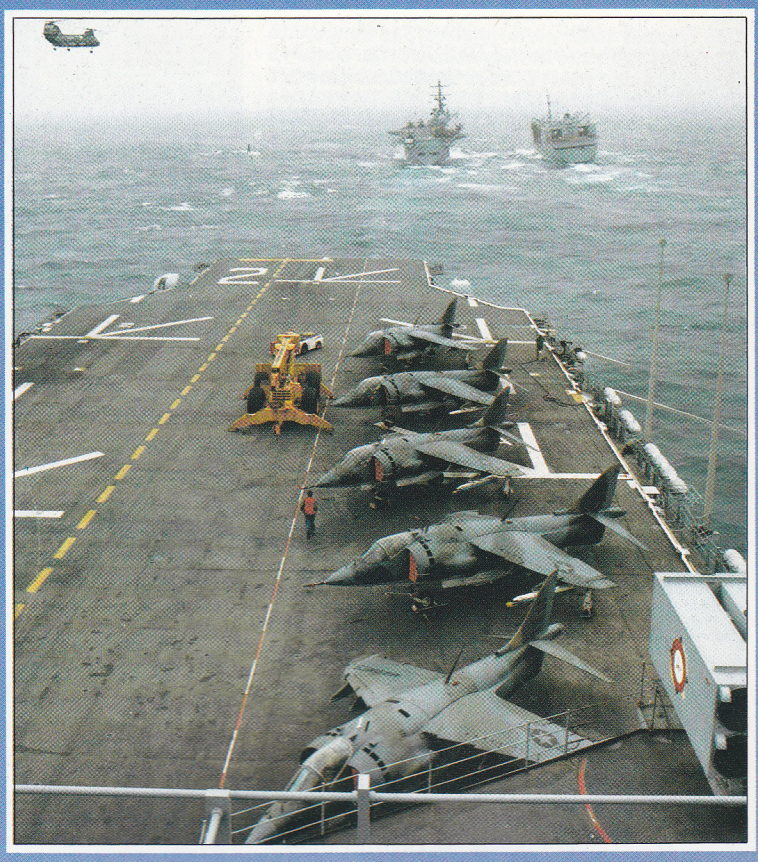
US Amphibious Forces

By far the largest amphibious forces are operated by the United States Navy with some two LCC, five LHA, seven LPH, 14 LPD, 13 LSD, 20 LST and five LKA in service. The vessels are used to form amphibious squadrons (PhibRon) that normally comprise between three or five amphibious warfare ships with two guided-missile and/or anti-submarine warfare frigates as escorts. Typically a PhibRon is composed of either one LPH, one LPD or one LSD and two LSTs, or of one LHA and two LSTs. Currently the US Navy has two PhibRons with each of the Pacific 3rd and 7th Fleets, three PhibRons with the Atlantic 2nd Fleet and one with the Mediterranean 6th Fleet. One of the 7th Fleet units is intermittently deployed with the US Navy's Indian Ocean Task Force. The PhibRon is required to have a sustained speed capability of 20 kts, which has been met by all the current and future American amphibious warfare ships. If any further heavy equipment is required for a landing then one of the LKAs will be attached to the PhibRon unit.

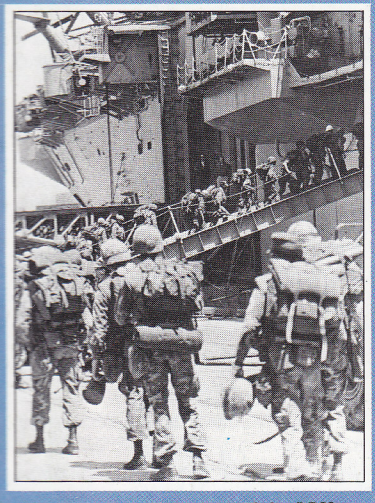
The United States Marine Corps is used to provide the amphibious assault units. There are three regular (1st, 2nd and 3rd) and one reserve (4th) US Marine infantry divisions plus one independent (7th) US Marine infantry brigade available. These, apart from the brigade, are normally deployed as composite Marine Battalion Landing Teams to PhibRons with organic tank, artillery and helicopter support units. Only one such team in the Mediterranean and one in the Pacific are regularly constituted. Another team without the helicopter support is deployed in the Pacific whilst a fourth, again without the helicopters, is occasionally formed for the Atlantic fleet. Two of the regular divisions and the reserve division are home-based in the United States, whilst the other divisions (less one brigade in Hawaii) is deployed to Japan and Okinawa. The composite battalions are made up from the divisions as required. The independent brigade is assigned to the Joint Deployment Task Force (JDTF) and is based in the United States.

In addition to the major amphibious units already noted the US Navy and US Army operate large numbers of smaller landing craft, and the US Marine Corps has the LVTP-7 tracked amphibious personnel carrier and new air cushion landing craft. The various types can also be found in a large number of other navies.

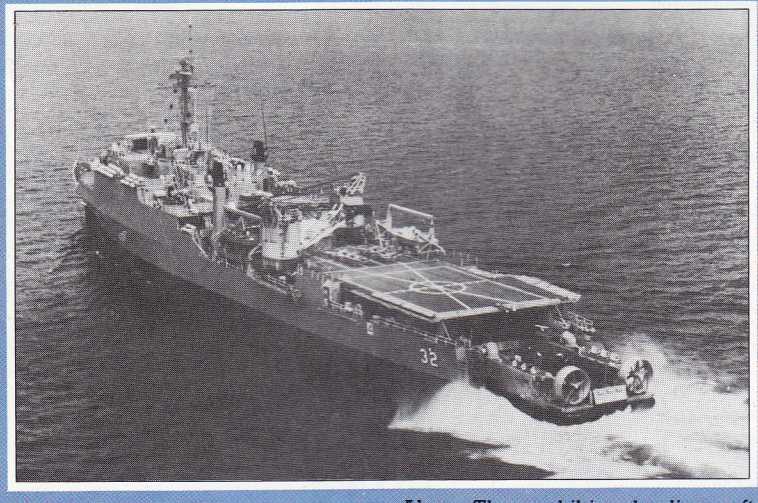
The most recent information on American landing ships available indicates that the 'Iwo Jima' class (LPH) ships will start a refit programme in 1986 to increase their operational life by between three and five years. The 'Austin' class (LPD) ships will also have refits of a similar type to extend their lives by between 10 to 15 years, whilst the 'Thomaston' class LPD ships will be phased out as scheduled. The four LKAs currently in the Naval Force Reserve will be returned to first-line service.



Above: A lineup of V/STOL AV-8A Harriers on the deck of USS Saipan *(LHA2).*



Above: US Marines board the LPH USS Guadalcanal *for Exercise 'Solid Shield' 1977.*

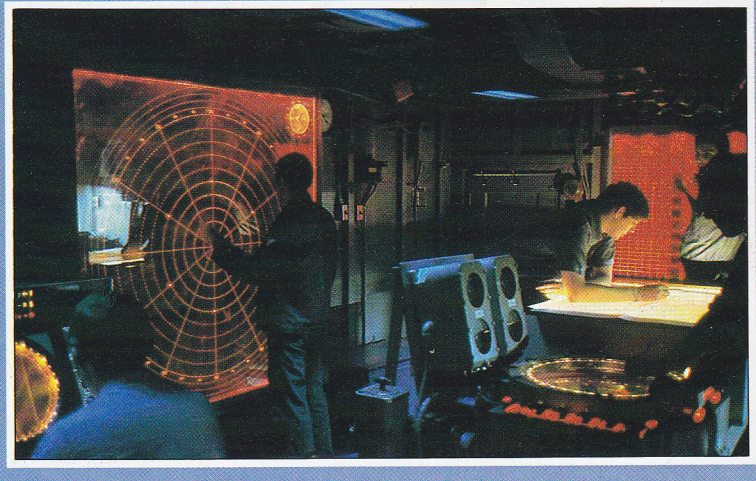


Below: The LST USS Fairfax County *in company with the LPH USS* Inchon.

Above: The experimental SES-100B of the US Navy makes a high speed run.

Above: The amphibious landing craft Jeff-B *operating in the Gulf of Mexico from the LSD USS* Spiegel Grove.

Below: The command centre of the command ship USS Whitney.



USA

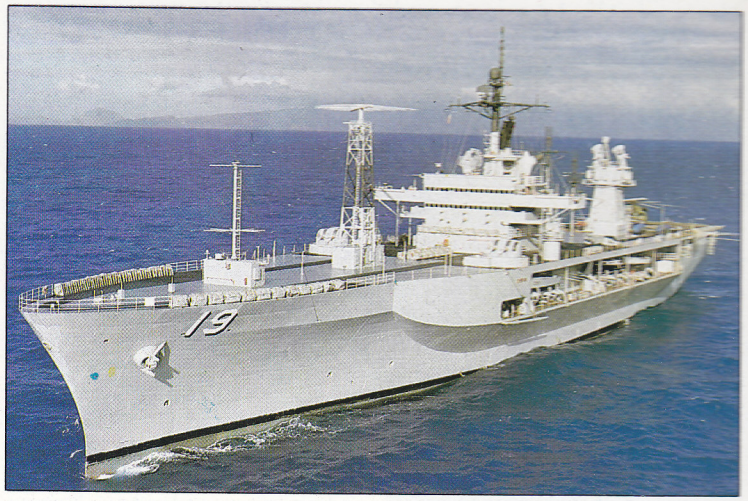
'Blue Ridge' Amphibious Command Ships (LCC)

The two **'Blue Ridge'** class integrated air, land and sea amphibious assault command ships are the first and only ships constructed by any nation solely for that role. A third ship of the class (designed at the outset for both amphibious and fleet command) was also programmed but was subsequently cancelled. In the late 1970s, as a result of the retirement of the elderly 'Cleveland' class flagship cruisers the two 'Blue Ridge' vessels also took on fleet flagship duties, the *Blue Ridge* herself becoming the flagship of the West Pacific 7th fleet and *Mount Whitney* the flagship of the Atlantic 2nd fleet.

The basic hull design and propulsion machinery is similar to that of the 'Iwo Jima' class LPHs, with the larger hangar area devoted to accommodation, offices and operations rooms required by the maximum possible 200 officers and 500 enlisted men of the embarked flag group. The ships have comprehensive satellite communications, command, control and intelligence analysis facilities fitted. These include the Amphibious Command Information System (ACIS); the Naval Intelligence Processing System (NIPS); the Naval Tactical Data System (NTDS) with its AN/UYK-20 and AN/UYK-7 digital computers to give an overall picture of the tactical underwater, surface and air warfare situations; Link 11 and Link 14 automatic data transmission systems to allow the exchange of tactical information with NTDS-equipped ships and Airborne Tactical Data System (ATDS)-equipped aircraft; extensive photographic laboratories and document publication facilities; and the satellite communications system with OE82 antenna, SSR-1 receiver and WSC-3 transceiver.

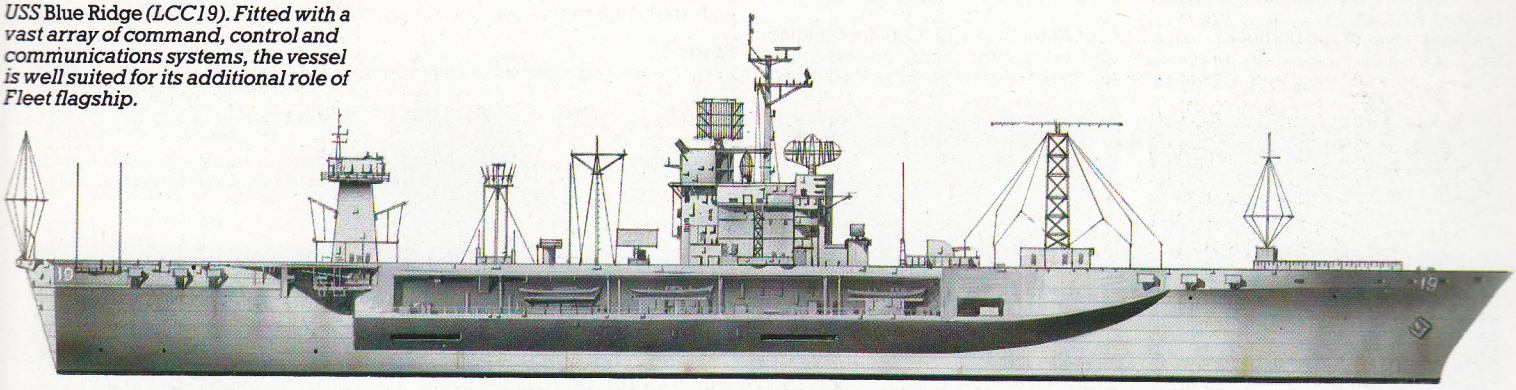
The vessels each carry three LCPs, two LCVPs and one 10-m (32.8-ft) personnel launch in Welvin davits situated in prominent sponsons projecting from the ships' sides. A helicopter landing area is located at the stern but there are no hangar or maintenance facilities aboard. A small vehicle garage and elevator are provided. When necessary the ships operate two small utility helicopters as the ship's flight.

Specification:
Names: *Blue Ridge* (LCC19) and *Mount Whitney* (LCC20)
Commissioned: LCC19 14 November 1970 and LCC20 16 January 1971
Displacement: 19,290 tons full load
Dimensions: length 189 m (620 ft); beam 25 m (82 ft); draught 8.8 m (29 ft)
Propulsion: one geared steam turbine delivering 22,000 shp to one shaft
Speed: 23 kts maximum and 20 kts sustained
Complement: LCC19 799 (41 officers plus 758 enlisted men) and LCC20 516 (41 officers plus 475 enlisted men)
Flag group: LCC19 250 (50 officers plus 200 enlisted men) and LCC20 420 (160 officers plus 260 enlisted men)
Armament: two twin Mk 33 76-mm (3-in) AA, two 8-tube Mk 25 Sea Sparrow BPDMS launchers (two 20-mm Mk 16 Phalanx CIWS to be fitted)
Electronics: one SPS-48 3D-search radar, one SPS-10 surface-search radar, one SPS-40 air-search radar, two Mk 115 missile fire-control systems, one target designation system, two Mk 56 gun fire-control systems, two Mk 35 fire-control radars, one Mk 36 Super RBOC Chaffroc launcher system and associated ESM equipmnt, one URN20 TACAN.



The nerve centre of an amphibious assault, the command ship USS* Blue Ridge *(LCC19). The* Blue Ridge *also serves as the US 7th Fleet flagship and is homeported at Yokosuka, Japan.

USS* Blue Ridge *(LCC19). Fitted with a vast array of command, control and communications systems, the vessel is well suited for its additional role of Fleet flagship.



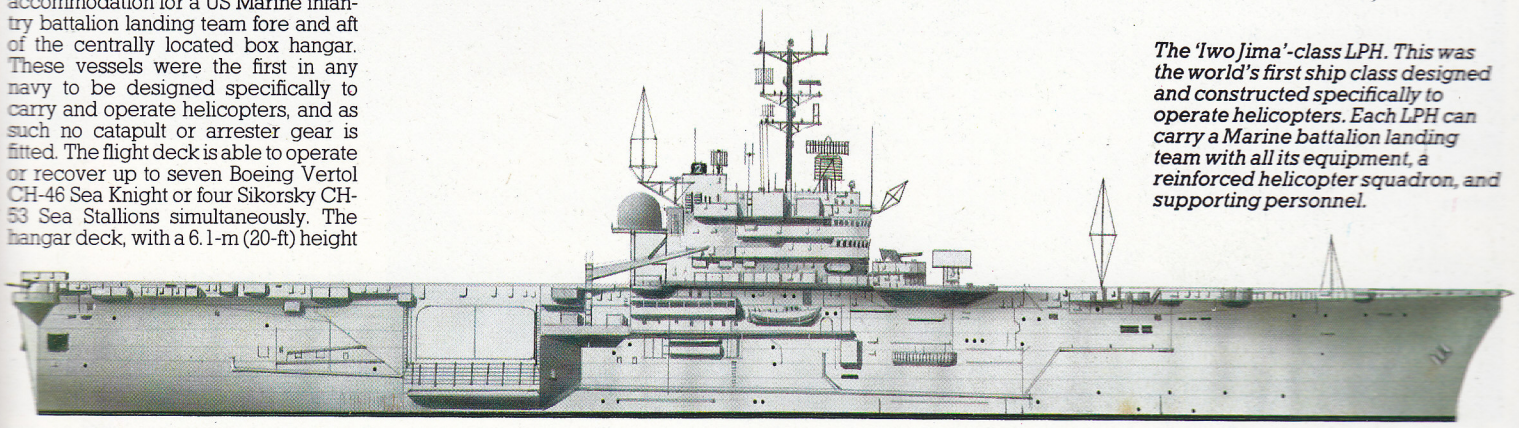
USA

'Iwo Jima' Class Amphibious Assault Ships Helicopter (LPH)

Ever since 1955, when the former escort carrier *Thetis Bay* was converted to a helicopter assault ship, the United States Navy has maintained a vertical airlift capability for the US Marine Corps. The **'Iwo Jima'** class ships were built to an improved World War II escort carrier design with accommodation for a US Marine infantry battalion landing team fore and aft of the centrally located box hangar. These vessels were the first in any navy to be designed specifically to carry and operate helicopters, and as such no catapult or arrester gear is fitted. The flight deck is able to operate or recover up to seven Boeing Vertol CH-46 Sea Knight or four Sikorsky CH-53 Sea Stallions simultaneously. The hangar deck, with a 6.1-m (20-ft) height clearance can accommodate 19 CH-46s or 11 CH-53s. The normal air group is a mixture of 24 CH-46, CH-53, Bell AH-1 and Bell UH-1 helicopters. On LPH2, 3, 11 and 12 two foldable 22727-kg (50,100-lb) capacity deck-edge lifts are carried, whilst on LPH7, 9 and 10 the lifts have been reduced to 20000-kg (44,090-lb) capacity. Because (with the exception of LPH12 which has two LCVPs on davits) they do not carry landing craft, the ships are limited in the size of equipment they can carry for the embarked US Marines. Two small elevators carry palletized cargo from the cargo holds to the flight deck, whilst a small parking area for light vehicles and towed artillery pieces is also provided.

During 1972 to 1974 LPH9 operated as an interim sea control ship carrying BAe AV-8A Harrier VTOL fighters and Sikorsky SH-3 Sea King ASW helicopters. When converted back to an LPH

The 'Iwo Jima'-class LPH. This was the world's first ship class designed and constructed specifically to operate helicopters. Each LPH can carry a Marine battalion landing team with all its equipment, a reinforced helicopter squadron, and supporting personnel.



LPH9, USS Guam, *carrying three Marine Corps AV-8A Harrier aircraft. In 1971 the* Guam *was modified to operate as an interim Sea Control Ship, carrying both Harriers and Sea King ASW helicopters.*

she retained the Air Surface Classification and Analysis Centre (ASCAC) that was fitted for the experimental role. Several other LPHs have also operated as minesweeping headquarters boats, embarking US Navy RH-53 helicopter minesweeping units. These vessels cleared North Vietnamese ports in 1973 and the Suez Canal in 1974. All helicopter operations are controlled from a dedicated command and control centre located in the flight deck island. All except LPH10 carry the same satellite communications equipment as the LCCs. They have the same 300-bed hospital unit as the LHAs. Four ships serve with the Atlantic fleets and three with the Pacific fleets.

Specification:
Names: *Iwo Jima* (LPH2), *Okinawa* (LPH3), *Guadalcanal* (LPH7), *Guam* (LPH9), *Tripoli* (LPH10), *New Orleans* (LPH11) and *Inchon* (LPH12)
Commissioned: LPH2 26 August 1961, LPH3 14 April 1962, LPH7 20 July 1963, LPH9 16 January 1965, LPH10 6 August 1966, LPH11 16 November 1968 and LPH12 20 June 1970
Displacement: 18,300 tons full load
Dimensions: length 183.7 m (602.3 ft); beam 25.6 m (84 ft); draught 7.9 m (26 ft)
Propulsion: one geared steam turbine delivering 22,000 shp to one shaft
Speed: 23 kts maximum and 20 kts sustained
Complement: 652 (47 officers plus 605 enlisted men)
Troops: 2,090 (190 officers and 1,900 enlisted men)
Cargo: total 399.6-m^2 (4,300-sq ft) vehicle parking area; LPH12 two LCVPs; maximum 19 CH-46 helicopters in hangar plus seven on deck; 24605 litres (6,500 US gal) MOGAS vehicle fuel; 1533090 litres (405,000 US gal) JP5 aviation fuel; 1059.8 m^3 (37,425 cu ft) palletized stores
Armament: two twin Mk 33 76-mm (3-in) AA guns, two 8-tube Mk 25 Sea Sparrow BPDMS launchers; two 40-mm saluting guns; two 20-mm Mk 16 Phalanx CIWS to be fitted
Electronics: one SPS-10 surface-search radar, one SPS-40 air-search radar, one SPN-10 or SPN-43 aircraft landing aid radar system, one Mk 36 Super RBOC Chaffroc launcher system with associated ESM equipment, one URN-20 TACAN

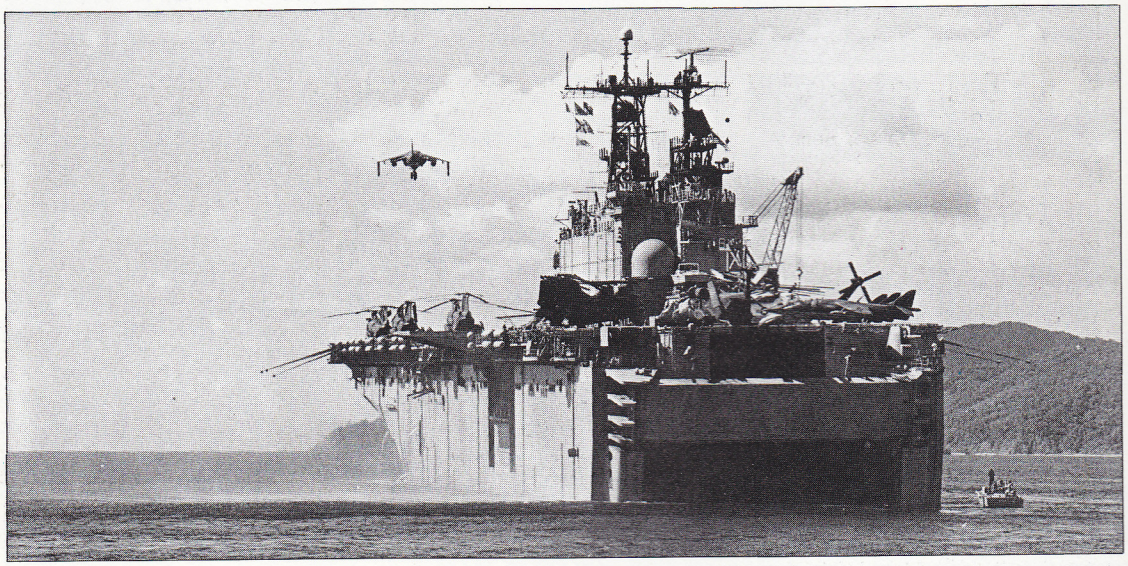
Based on an improved World War II escort carrier design, the 'Iwo Jima'-class vessels were the first to specifically accommodate helicopters. Here USS Inchon *(LPH12) is shown with CH-46s on deck.*

USA

'Tarawa' Class General-Purpose Amphibious Assault Ships (LHA)

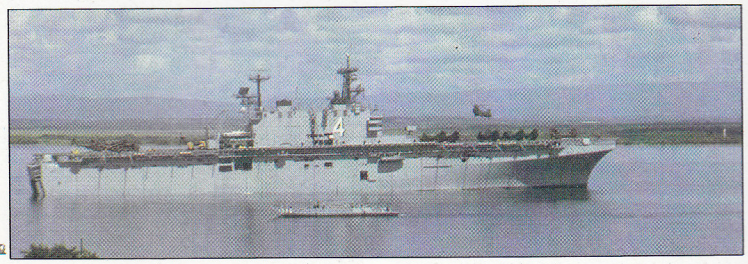
The **'Tarawa'** class ships are the largest amphibious warfare ships yet constructed. They are intended to combine the capabilities of the LPH, the LPD, the LCC and the LKA in a single hull. The class was originally to have numbered nine, but as a result of the end of the Vietnam War and budgetary constraints the eventual number built was five. The Litton/Ingalls Pascagoula shipyard built them by means of its multi-ship construction technique between 1971 and 1979.

The ship's sides are vertical for some two-thirds of the length in order to maximize the internal space available for cargo. An 81.7 m (268 ft) long by 23.8 m (78 ft) wide hangar with a 6.1 m (20 ft) overhead is located above a similarly sized well deck set into the stern. The hangar is served by an 18182-kg (40,085-lb) capacity side lift to port and a larger 36364-kg (80,170-lb) capacity centreline lift at the stern. The docking well, vehicle deck, cargo holds and hangar deck are connected by a series of five elevators capable of carrying 1000-kg (2,205-lb) palletized loads. The three forward elevators serve the vehicle deck and use a conveyor belt system, whilst the aft two elevators (located at the other end of the belt) serve both the well deck, where an overhead cargo-carrying monorail system takes the pallets onto the landing craft, and the hangar deck. An angled ramp from the hangar deck leads to the flight deck to allow direct loading of helicopters.

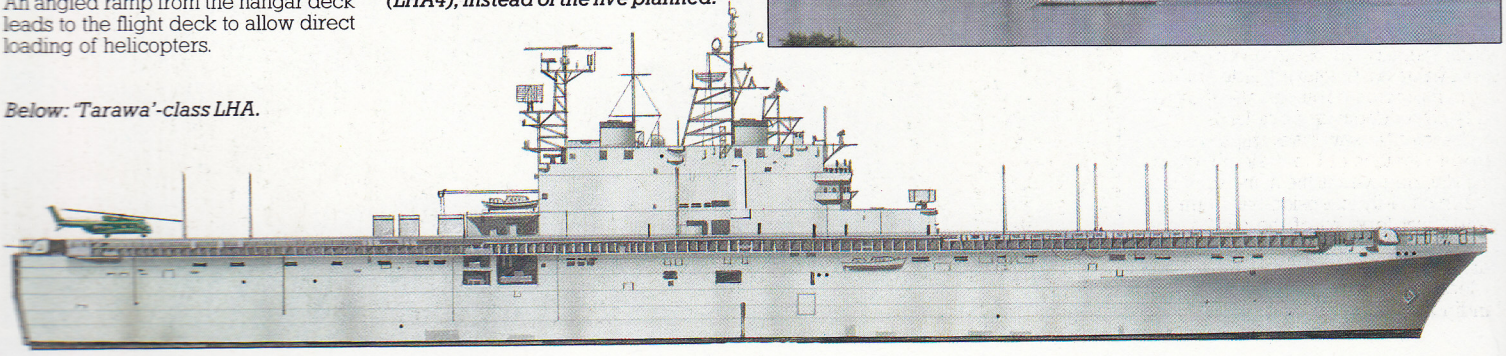


Above: Lead ship of the LHA class, USS Tarawa, *about to recover a Marine Corps V/STOL AV-8A Harrier during the 1980 Philippines 'Valiant Blitz' exercise.*

Right: As a result of post-Vietnam budget restraints, only one more LHA was built after USS Nassau *(LHA4), instead of the five planned.*



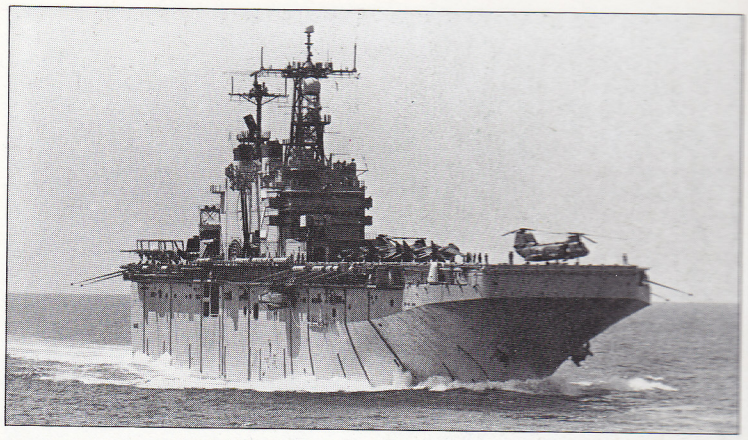
Below: 'Tarawa'-class LHA.



Forward of the docking well (and connected to it and the flight deck by ramps) are the vehicle decks. These normally accommodate 160 tracked vehicles, artillery pieces and trucks together with 40 LVTP-7 amphibious assault personnel carriers. The well deck can accommodate up to four LCUs or two LCUs and three LCM8s or 17 LCM6s. The four LCUs and eight LVTP-7s can be launched simultaneously from the well deck. The vessels themselves normally carry two LCM6s and two LCPs stowed on deck for launch by a large deck crane. The aircraft hangar has the capacity for 30 Boeing Vertol CH-46 Sea Knight or 19 Sikorsky CH-53 Sea Stallion helicopters, although the normal air group embarked tends to be either 12 CH-46s, six CH-53s, four Bell AH-1 SeaCobra gunships and two Bell UH-1 utility or six CH-46s, nine CH-53s, four AH-1s and the two UH-1 helicopters. Both the BAe AV-8A Harrier and the Rockwell OV-10 Bronco fixed-wing aircraft have also been operated, the former being a VTOL close-support fighter and the latter a STOL observation/attack aircraft. A 464.5 m^2 (5,000 sq ft) training and acclimatization room is fitted for the 1,900-man reinforced US Marine battalion carried to exercise in a controlled environment. A 300-bed medical unit (with operating rooms, X-ray room, isolation ward, hospital ward, laboratories, pharmacy, dentistry room, mortuary and medical store rooms) is also carried.

To act as an amphibious squadron flagship the LHA is fitted with the Tactical Amphibious Warfare Data System (TAWDS) to provide command and control over the group's aircraft, weapons, sensors and landing craft. The same satellite communications system and data links as fitted to the LCCs are carried. Two of the LHAs are assigned to the Atlantic fleets while the other three are with the Pacific fleets.

Specification:
Names: *Tarawa* (LHA1), *Saipan* (LHA2), *Belleau Wood* (LHA3), *Nassau* (LHA4), *Peleliu* (LHA5)
Commissioned: LHA1 29 May 1976, LHA2 15 October 1977, LHA3 23 September 1978, LHA4 28 July 1979 and LHA5 3 May 1980
Displacement: 39,300 tons full load
Dimensions: length 250 m (820 ft); beam 32.3 m (106 ft); draught 7.9 m (26 ft)
Propulsion: two geared steam turbines delivering 70,000 shp to two shafts
Speed: 24 kts maximum and 22 kts sustained
Complement: 902 (90 officers plus 812 enlisted men)
Troops: 1,903 (172 officers plus 1,731 enlisted men)
Cargo: total of 3134-m^2 (33,735-sq ft) vehicle parking area; four LCUs or two LCUs and three LCM8s or 17 LCM6s plus two LCM6s and two LCPs; maximum 30 CH-46 plus 12 on flight deck; 37855 litres (10,000 US gal) of MOGAS vehicle fuel; 378540 litres (100,000 US gal) of JP5 aviation fuel; 3311 m^3 (116,925 cu ft) palletized stores
Armament: three single Mk 45 127-mm (5-in) DP guns, six single Mk 67 20-mm AA guns, two 8-tube Mk 25 Sea Sparrow BPDMS launchers, to be replaced by two 20-mm Mk 16 Phalanx CIWS
Electronics: one SPS-52B 3D-search radar, one SPS-40B air-search radar, one SPS-10F air-search radar, one Mk 86 gun fire-control system, two Mk 115 missile fire-control systems, one SPG-60 fire-control radar, one SPQ-9A fire-control radar, one SPN-35 navigation radar, one SPS-53 navigation radar, one Mk 36 Super RBOC Chaffroc launcher system with associated ESM equipment, one URN-20 TACAN



LHA2 USS* Saipan.** ***The LHA class will be joined by up to 12 of the similar but slightly larger LHD class, the first five of which will augment the US Navy's current amphibious lift assets. The remaining seven will replace the LPHs from the late 1990s on a one-for-one basis.

USA

'Raleigh' and 'Austin' Class Amphibious Transport Docks (LPD)

The LPD is a further development of the dock landing ship (LSD) with an increased troop and vehicle capacity at the expense of a reduction in the dock well size. The LPD essentially combines the troop-carrying of the APA with part of the cargo-carrying AKA, and the vehicle and landing craft capabilities of the LSD designs in one hull. Of the three-ship **'Raleigh'** class one has been converted to the Command Middle East Force (COMIDEASTFOR) flagship. This ship, USS *La Salle*, serves with the Indian Ocean task forces. The 'Raleigh' class ships have a stern docking well 51.2 m (168 ft) long and 15.2 m (50 ft) wide that can accommodate one LCU and three LCM6s, or four LCM8s, or 20 LVTP-7 amphibious vehicles. In addition two LCM6s or four LCPLs are carried on the helicopter and lifted overboard by crane. The helicopter deck covers the landing craft well, but there are no onboard hangar or maintenance facilities. Up to six Boeing Vertol CH-46 helicopters can be operated for short times from the deck. An overhead monorail stores-transfer system is used to load the landing craft in the well deck from the forward cargo holds. Ramps connect the vehicle decks, docking well and flight deck, which can also be used to park additional vehicles if required. Side ports in the hull provide a roll-on/roll-off capability when docks are available.

The later **'Austin'** class ships are enlarged versions of the 'Raleigh' class. The docking well is the same size, but a 12-m (39.4-ft) extension has been inserted just forward of the well to increase the vehicle- and cargo-carrying capacities. A fixed flight deck is located above the well with two landing spots. All except LPD4 are fitted with a variable 17.7 m (58 ft) to 19.5 m (64 ft) long, 5.8 m (19 ft) to 7.3 m (24 ft) wide hangar that can be extended to about 24.4 m (80 ft) long if required. Up to six CH-46s can be operated, although the hangar can accommodate only one utility helicopter. The LVTP-7 capacity is increased

Right: Similar to but larger than HMS* Fearless, *USS* Shreveport *(LPD12), can, like several of her sisters, act as an amphibious squadron flagship.

Below: The Austin class LPD USS* Dubuque. *From 1986 onwards this class, together with the 'Iwo Jima'-class LPHs, will undergo a service life extension programme (SLEP).

to 28 with alternative loads of one LCU and three LCM6s or nine LCM6s or four LCM8s. LPD7 to LPD 13 are fitted with amphibious squadron flagship duties with an additional superstructure deck. Both classes have satellite communications systems of the type fitted to the LCCs. One 'Raleigh' and seven 'Austin' class ships serve with the Atlantic fleets, whilst six 'Austin' class and the other 'Raleigh' class ships serve in the Pacific fleets.

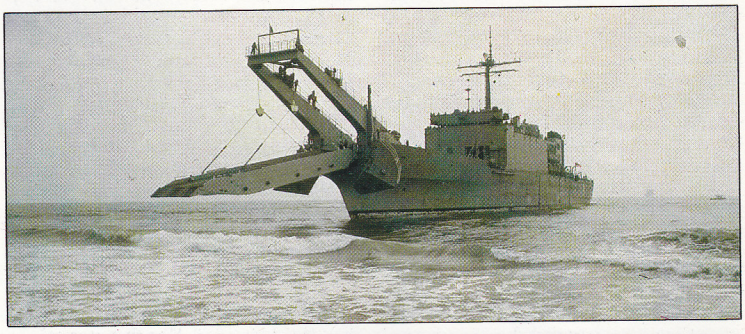
Specification:
Names: *Raleigh* (LPD1) and *Vancouver* (LPD2); *Austin* (LPD4), *Ogden* (LPD5), *Duluth* (LPD6), *Cleveland* (LPD7), *Dubuque* (LPD8), *Denver* (LPD9), *Juneau* (LPD10), *Coronado* (LPD11), *Shreveport* (LPD12), *Nashville* (LPD13), *Trenton* (LPD14) and *Ponce* (LPD15)
Commissioned: 1962 to 1971
Displacement: LPD1/2 13,900 tons full load; LPD4/6 15,900 tons full load; LPD7/10 16,550 tons full load; LPD11/13 16,900 tons full load: LPD14/15 17,000 tons full load
Dimensions: (LPD1 and LPD2) length 159.1 m (521.8 ft); beam 30.5 m (100 ft); draught 6.7 m (22 ft); (LPD4 to LPD15) length 173.8 m (570 ft); beam 30.5 m (100 ft); draught 7 m (23 ft)
Propulsion: two geared steam turbines delivering 24,000 shp to two shafts
Speed: 21 kts maximum and 20 kts sustained
Complement: LPD1 413 (24 officers plus 389 enlisted men); LPD2 410 (23 officers plus 387 enlisted men); LPD4 to LPD15 410-447 (24-5 officers plus 386-442 enlisted men)
Flag group: LPD7 to LPD13 90
Troops: LPD1 to LPD6 930; LPD7 to LPD13 840; LPD14 and LPD15 930
Cargo: LPD4 to LPD15 (LPD1/2 figures are reduced slightly) total 1034.1-m^2 (11,130-sq ft) vehicle parking area; one LCU and three LCM6s or nine LCM6s or four LCM8s or 28 LVTP-7s; 616 m^3 (21,750 cu ft) of palletized stores or 472 m^3 (16,670 cu ft) of ammunition; 5900 litres (22,335 US gal) of MOGAS vehicle fuel; 368425 litres (97,328 US gal) of AVGAS aviation fuel; 17035 litres (4,500 US gal) of AV-LUB oil; 850095 litres (224,572 US gal) of JP5 aviation fuel
Armament: LPD1/2 three twin Mk 33 76-mm (3-in) AA guns, LPD4/15 two twin Mk 33 76-mm (3-in) AA guns; all to be fitted with two 20-mm Mk 16 Phalanx CIWS
Electronics: one SPS-10 surface-search radar, one SPS-40 air-search radar, one URN-20 TACAN; one Mk 36 Super RBOC Chaffroc system to be fitted in all

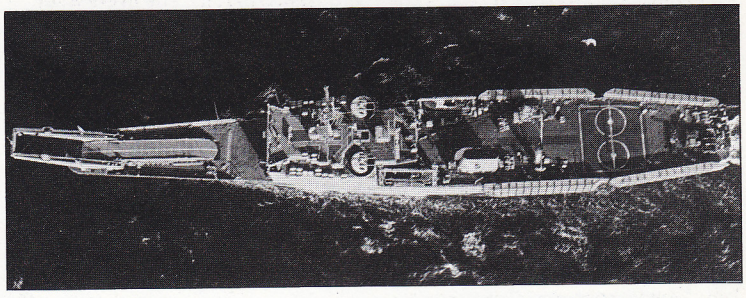
USA

'Newport' Class Landing Ships Tank (LST)

The **'Newport'** class represents the ultimate design in post-World War II LST design. The vessels use a pointed bow which allows them to sustain the speed of 20 kts required by American amphibious ships. There are both bow and stern ramps for unloading vehicles. The 34-ton aluminium bow ramp is 34.14 m (112 ft) long and can carry up to 75-ton loads. It is handled over the bow by two supporting derrick arms. The stern ramp has direct access to the tank deck to allow the unloading of LVTP-7s directly into the water. The stern ramps can also be mated to a landing craft or a pier for unloading purposes. Vehicles are driven onto the lower deck via a 75-ton capacity ramp or through a passage in the superstructure that leads to the helicopter deck aft. This has no hangar or helicopter maintenance facilities. Four pontoon causeway sections can be carried on the hull sides. These are handled by two derrick cranes located immediately aft of the two funnel intakes. The vehicle decks can alternatively be used for 500 tons of general cargo if required. Cargo space for ammunition, diesel fuel, MOGAS fuel and AVGAS supplies are also available. A total of nine ships are with the Atlantic fleets, and nine with the Pacific fleets. The remaining two are with the Naval Reserve Force, one in the Atlantic and one in the Pacific. An OE82 satellite communications antenna and WSC-3 transceiver is fitted on all ships.

USS* Newport *(LST1179) standing just offshore and in the process of lowering her bow ramp for vehicle disembarkation during a landing exercise.





Specification:
Class: *Newport* plus 19 others
Commissioned: 1969-72
Displacement: 8342-8450 tons full load
Dimensions: length 159.2 m (522.3 ft); beam 21.2 m (69.5 ft); draught 5.3 m (17.5 ft)
Propulsion: six diesels delivering 16,500 bhp to two shafts
Speed: 20 kts sustained
Complement: 225 (14 officers plus 211 enlisted men)
Troops: 431 (20 officers plus 211 enlisted men)
Cargo: total 1765-m^2 (19,000-sq ft) vehicle parking area for 25 LVTP-7s and 17 2½-ton trucks, or 21 M48/M60 MBTs and 17 2½-ton trucks, or 500 tons of general cargo; three LCVPs and one LCPL; 72.3 m^3 (2,550 cu ft) ammunition; 508900 litres (134,438 US gal) of AVGAS aviation fuel; 27230 litres (7,194 US gal) of MOGAS vehicle fuel; 96150 litres (25,400 US gal) of diesel fuel
Armament: two twin Mk 33 76-mm (3-in) AA guns (to be replaced by two 20-mm Mk 16 Phalanx CIWS)
Electronics: one SPS-10 surface-search radar, one LN/66 navigation radar, one Mk 36 Super RBOC Chaffroc launcher system

From above, USS* Harlan County *(LST1196) displays the unusual lines of the 'Newport' class. Visible on the hull sides astern of the funnels are four detachable pontoon/causeway sections.

USA

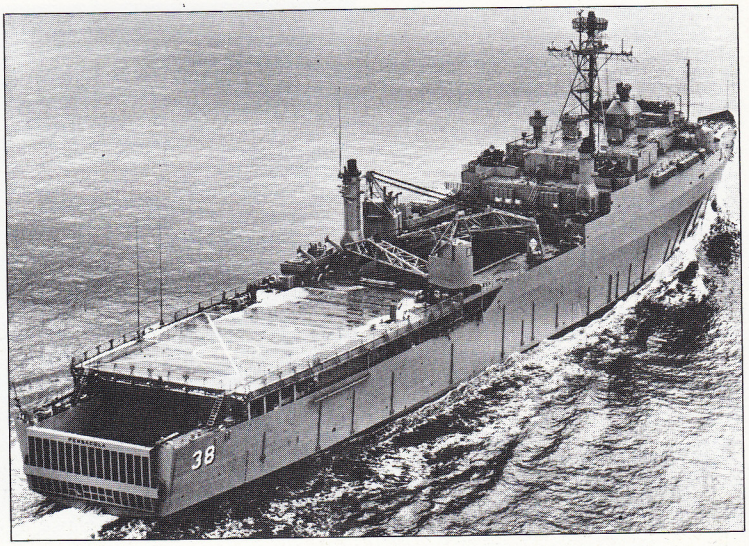
'Cabildo', 'Thomaston' and 'Anchorage' Class Landing Ships Dock (LSD)

The LSD is a World War II design for carrying landing craft and heavy vehicles such as tanks. There are no **'Cabildo'** class LSDs still in service with the United States Navy, but three remain in service with other navies: the *Cheng Hai* with Taiwan, the *Nafkratoussa* as the HQ landing ship of the Greek navy and the *Galicia* with Spain. The 9,375-ton full load 'Cabildo' class can carry three LCUs or 18 LCM6s or 32 LVTP-5/7 amphibious carriers in its 103 m (338 ft) long, 13.3 m (43.66 ft) wide well deck. The class can also carry 1,347 tons of cargo, and 100 2½-ton trucks or 27 M48 MBTs or 11 helicopters as well. Troop accommodation is limited to 137 overnight or 500 for short day runs. The crew numbers 18 officers and 283 enlisted men. Maximum speed is 15.4 kts and the armament is a variable number of 40-mm AA guns. A helicopter platform is fitted over the well deck although no hangar or maintenance facilities are carried.

The **'Thomaston'** class was the first post-World War II LSD design, and stemmed from Korean War experiences. The docking well is 119.2 m (391 ft) long and 14.6 m (48 ft) wide, and can accommodate three LCUs or 19 LCM6s or nine LCM8s or 48 LVTP-7s. A vehicle-parking area forward of the dock can accommodate a further 30 LVTPs if required. The ship carries two LCVPs and two LCPLs in davits, but no palletized cargo is carried. The 'Thomaston' class ships are due to be relaced by the new 'Whidbey Island' class.

The **'Anchorage'** class is similar to the 'Thomaston' class, but the ships have a tripod mast to distinguish them.

USS* Pensacola *(LSD38) off the coast of Massachusetts. 'Anchorage'-class LSDs were designed to incorporate lessons learned in World War II and Korea, and are similar to the 'Thomaston'-class LSDs.



A removable helicopter landing platform is fitted over the major part of the docking well; the size of which has been increased to 131.1 m (430 ft) long by 15.2 m (50 ft) wide to accommodate three LCUs or 21 LCM6s or eight LCM8s or 50 LVTP-7s. The vessels also carry one or two LCM6s stowed on deck and one LCPL and one LCVP on davits. Troop capacity is also increased. Three 'Anchorage' class and four 'Thomaston' class ships serve with the Atlantic fleets whilst two 'Anchorage' and four 'Thomaston' class ships are with the Pacific fleets. Both classes have the LCC satellite communications fit.

Specification:
Names: *Thomaston* (LSD28), *Plymouth Rock* (LSD29), *Fort Snelling* (LSD30), *Point Defiance* (LSD31), *Spiegel Grove* (LSD32), *Alamo* (LSD33), *Hermitage* (LSD34) and *Monticello* (LSD35); *Anchorge* (LSD36), *Portland* (LSD37), *Pensacola* (LSD38), *Mount Vernon* (LSD39) and *Fort Fisher* (LSD40)
Commissioned: 1954 to 1972
Displacement: LSD28/31 and LSD35 11,270 tons full load; LSD32/34 12,150 tons full load; LSD36/40 13,700 tons full load
Dimensions: (LSD28 to LSD35) length 155.5 m (510 ft), beam 25.6 m (84 ft); draught 5.8 m (19 ft); (LSD36 to LSD40) length 168.6 m (553.3 ft); beam 25.6 m (84 ft); draught 6 m (20 ft)
Propulsion: two geared steam turbines delivering 24,000 shp to two shafts
Speed: 22.5 kts maximum and 20 kts sustained
Complement: LSD28/35 331-341 (18 officers plus 313-323 enlisted men), and LSD36/40 341-345 (18 officers plus 323-328 enlisted men)
Troops: LSD28/35 340, and LSD36/40 376
Cargo: LSD28/35 (LSD36/40 1115-m^2 (12,000-sq ft) vehicle parking area) total 975-m^2 (10,500-sq ft) vehicle parking area; three LCUs or 19 LCM6s or LCM8s or 48 LVTP-7s; 85 m^3 (3,000 cu ft) ammunition; 4540 litres (1,200 US gal) of AVGAS aviation or MOGAS vehicle fuel; 147650 litres (39,000 US gal) of diesel fuel
Armament: three twin Mk 33 76-mm (3-in) AA guns; two 20-mm Mk 16 Phalanx CIWS to be fitted
Electronics: one SPS-10 surface-search radar, one SPS-6 (or SPS-40 in LSD36/40) air-search radar, one Mk 36 Super RBOC Chaffroc system with associated ESM equipment

USS* Anchorage *(LSD36) is very similar to the earlier and marginally smaller 'Thomaston' class of LSDs. She can accommodate three LCUs or up to 48 Marine LVTP-7 amphibians.

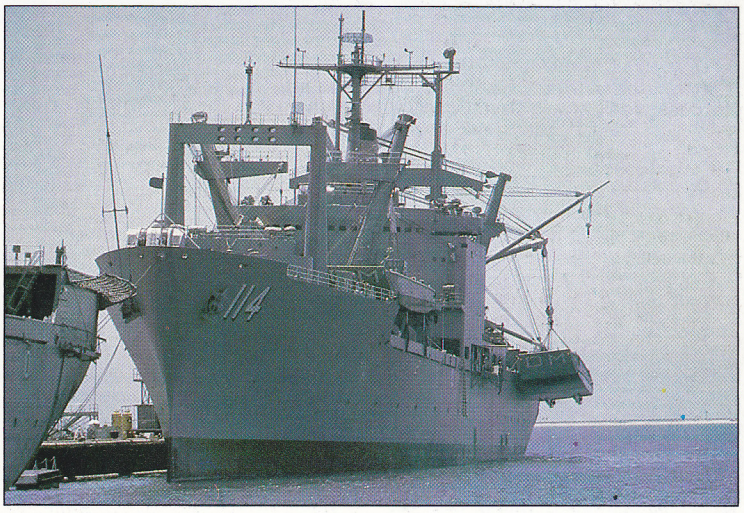
USA

'Charleston' Class Amphibious Cargo Ships (LKA)

Currently only one of the five **'Charleston'** class LKAs is assigned as a fully active unit. The vessel is assigned to the Atlantic fleet whilst the others are assigned in pairs to the Naval Reserve Force Units of the Atlantic and Pacific fleets. The LKA is designed to carry all the heavy equipment and supplies for the amphibious assault landing, and are the first to be designed specifically and built for the role. All previous ships of either the LKA or assault transport (LPA) types were either converted from or built to merchant ship designs. The class is fitted with a helicopter landing pad aft but no hangar or maintenance facilities are carried. Troop accommodation is limited to 226 but four LCM8s, four LCM6s, two LCVPs and two LCPs are normally carried as deck cargo. The landing craft and super heavy equipment are offloaded by two 78.4-ton capacity heavy-lift cranes. There are also two 40-ton capacity booms and eight 15-ton capacity booms aboard. Cargo holds for palletized stores and ammunition are provided together with vehicle parking areas.

Originally designated Attack Cargo Ship (AKA), USS* Durham *was redesignated Amphibious Cargo Ship (LKA) in 1969. The five-vessel 'Charleston' class was the first class in the US Navy fitted with fully automated main propulsion plants.

Specification:
Names: *Charleston* (LKA113), *Durham* (LKA114), *Mobile* (LKA115), *St Louis* (LKA116) and *El Paso* (LKA117)
Commissioned: LKA113 19 December 1968, LKA114 24 May 1969, LKA115 29 September 1969, LKA116 22 November 1969 and LKA117 17 January 1970
Displacement: 18,600 tons full load
Dimensions: length 175.4 m (575.5 ft); beam 18.9 m (62 ft); draught 7.7 m (25.5 ft)
Propulsion: one steam turbine delivering 19,250 shp to one shaft
Speed: 20 kts sustained
Complement: 325 (24 officers and 301 enlisted men)
Troops: 226 (15 officers plus 211 enlisted men)



Cargo: not known
Armament: three twin Mk 33 76-mm (3-in) AA guns; two 20-mm Mk 16 Phalanx CIWS to be fitted
Electronics: One LN/66 navigation radar, one SPS-10 surface-search radar, one Mk 36 Super RBOC Chaffroc launcher system

USA

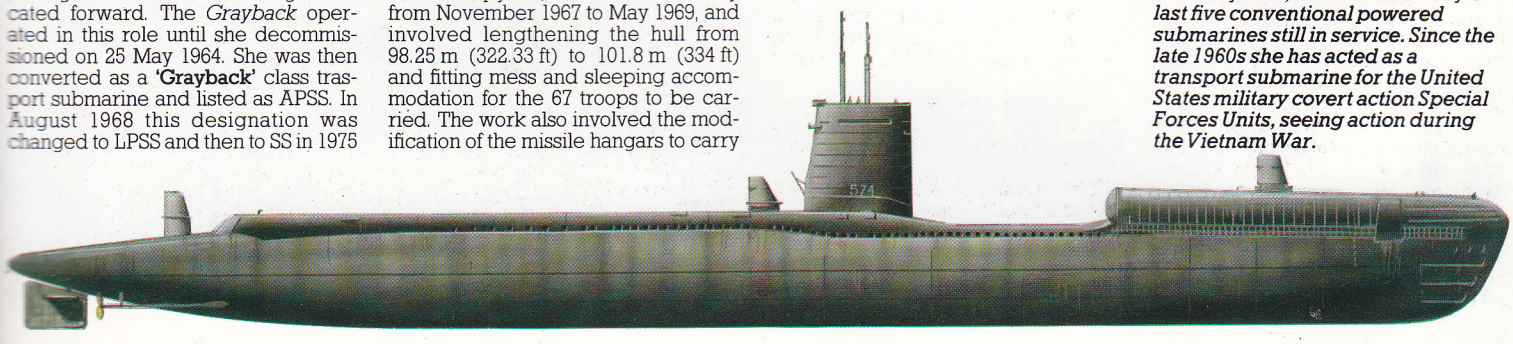
'Grayback' Class Transport Submarine

Although now classed as an attack submarine (SS) the USS *Grayback* was originally built with her near sister, USS *Growler*, as a cruise-missile submarine fitted to carry four Regulus I strategic missiles in two hangars located forward. The *Grayback* operated in this role until she decommissioned on 25 May 1964. She was then converted as a **'Grayback'** class trasport submarine and listed as APSS. In August 1968 this designation was changed to LPSS and then to SS in 1975 for administrative reasons, to allow continued funding support from the US Congress.

The conversion to the transport role was carried out at the Mare Island Naval Shipyard, San Francisco Bay from November 1967 to May 1969, and involved lengthening the hull from 98.25 m (322.33 ft) to 101.8 m (334 ft) and fitting mess and sleeping accommodation for the 67 troops to be carried. The work also involved the modification of the missile hangars to carry six swimmer delivery vehicles (SDV) and to be used to launch and recover both the SDVs and scuba-equipped divers underwater. The fin height was also increased and a Sperry BQG-4 Passive Underwater Fire Control System (PUFFS) sonar was fitted.

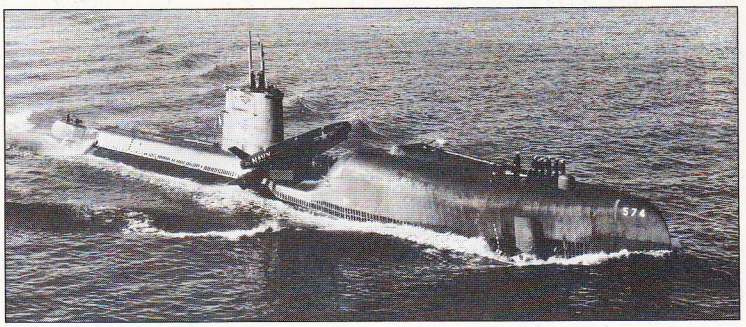
The submarine is used to carry com-

USS* Grayback, *one of the US Navy's last five conventional powered submarines still in service. Since the late 1960s she has acted as a transport submarine for the United States military covert action Special Forces Units, seeing action during the Vietnam War.



mando or other covert forces on special missions against targets that require approach from the sea. Typical units that might be carried are the US Army's Green Berets, the US Navy's Sea, Air and Land (SEAL) teams and Naval Underwater Demolition Teams (UDT). The last are used amongst other things to clear the approaches to beaches and to reconnoitre likely landing zones for amphibious assault units. The *Grayback* is on active service with the US Pacific Fleet, and is based at Subic Bay in the Philippines. The vessel retains her full submarine attack capability and carries the thermal-powered anti-ship Mk 14 32/46-kt 8200/4100-m (8,975/4,480-yard) range torpedo together with the electric powered 24-kt 8000-m (8,750-yard) range ASW Mk 37 torpedo. The newer Mk 48 is not carried because of the lack of support facilities at Subic Bay. The torpedo fire control system is the Mk 106 Model 12.

USS Grayback's bulbous hangars formerly housed four Regulus cruise missiles, which were launched from just ahead of the conning tower.



Specification:
Name: *Grayback* (SS574)
Commissioned: 9 May 1969 (as LPSS)
Displacement: 2,670 tons surfaced and 3,650 tons dived
Dimensions: length 101.8 m (334 ft); beam 8.3 m (27.2 ft); draught 5.8 m (19 ft)
Propulsion: three diesels delivering 4,800 shp and two electric motors delivering 5,500 shp to two shafts
Speed: 20 kts surfaced and 16.7 kts dived
Complement: 96 (10 officers plus 86 enlisted men)
Troops: 67 (seven officers plus 60 enlisted men)
Cargo: six SDVs
Torpedo tubes: six 533-mm (21-in) Mk 52 bow and two 533-mm (21-in) stern
Sonar: one BQS-4, one BQG-4 (PUFFS)

USA

US New Construction Amphibious Warfare Ships

The first of the new construction **'Whidbey Island'** class was laid down in August 1981 with an in-service date of 1984. The class is due to replace the eight-ship 'Thomaston' class, which is approaching the end of its US Navy career. The final total of the 'Whidbey Island' class is expected to be 10. The design is that of a modified 'Anchorage' one with a 134.1 m (440 ft) long by 15.2 m (50 ft) wide well deck for either four preloaded amphibious air cushion vehicles (LCAC), or three LCUs, or 21 LCM6s, or 64 LVTP-7s. The helicopter deck is raised above the well deck in order to provide all-round ventilation for the gas-turbine LCACs. No hangar facilities are provided, but the deck is capable of taking two Sikorsky CH-53 Sea Stallions simultaneously. An additional two LCPLs, one LCVP and an LCM6 will be carried as deck cargo and handled by two large cranes. Forward of the docking well are the vehicle parking areas whilst a small palletized cargo hold is available.

The other new ship under construction is known as the **Amphibious Assault Ship Multi-Purpose** (LHD). This is reminiscent in appearance to an LHA but combines the features of the LHA with an LPD. The LHD will transport more assault landing craft, including the LCAC, and have a greater helicopter capacity than the LHA. The cargo figures are up to 38 Boeing Vertol CH-46s in the hangar plus more on deck, two LCACs or 12 LCM6s, 3130 m^2 (33,700 sq ft) of vehicle parking space, 1700 m^3 (60,000 cu ft) of palletized stores and a troop capacity of around 1,800. The first of the class will enter service in 1989 to replace the LPHs. Maximum speed will be 24 kts, and the full-load displacement 39,500 tons on a length of 249 m (817 ft) and a beam of 32.3 m (106 ft).

Specification:
Name: *Whidbey Island* (LSD41) plus nine others
Commissioning: 1984
Displacement: 15,726 tons full load
Dimensions: length 185.6 m (609 ft); beam 25.6 m (84 ft); draught 6.3 m (20.5 ft)
Propulsion: four diesels delivering 41,600 bhp to two shafts
Speed: 22 kts
Complement: 376 (20 officers plus 356 enlisted men)
Troops: 440
Cargo: total 1214-m^2 (13,075-sq ft) vehicle parking area; four LCACs or three LCUs or 21 LCM6s or 64 LVTP-7s plus one LCM6, two LCPLs and one LCVP; 149 m^3 (5,250 cu ft) of palletized stores
Armament: two 20-mm Mk 16 Phalanx CIWS
Electronics: one SPS-49 air-search radar, one SPS-67 surface-search radar, one LN/66 navigation radar, one Mk 36 Super RBOC Chaffroc system with associated SLQ(V)-1 ESM system, one URN-25 TACAN

JAPAN

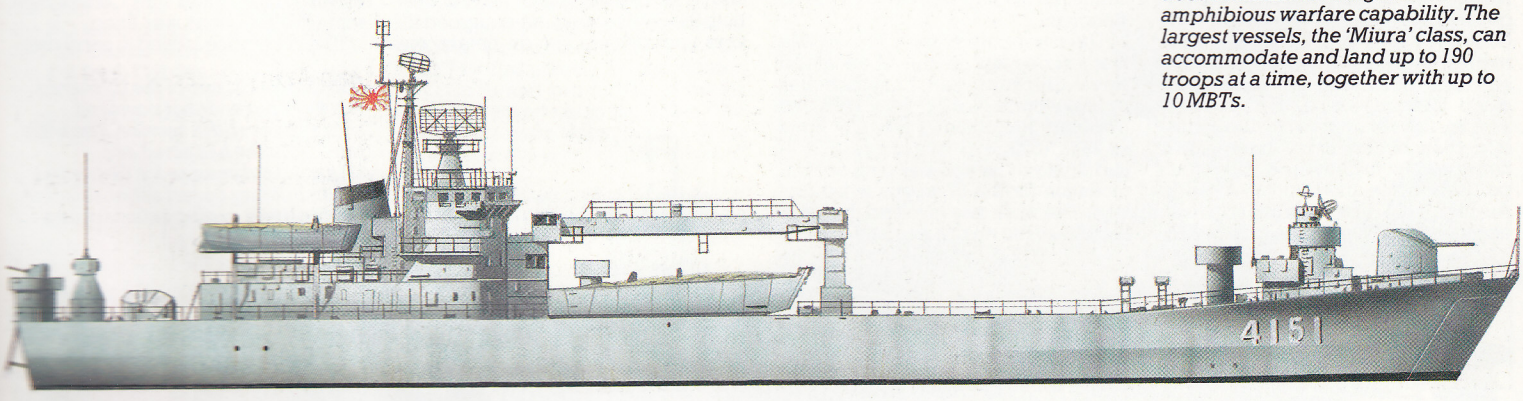
'Atsumi' and 'Miura' Class Landing Ships Tank

Although composed of several large and many smaller islands, Japan has relatively few amphibious assault ships, the reason being that such vessels tend to suggest an offensive rather than defensive naval role. Hence there is a distinct reluctance on the part of Japanese politicians rather than the Japanese Maritime Self-Defense Force to have a large number of such units available.

There are currently two main classes of amphibious warfare vessels in service, the **'Atsumi'** and the **'Miura'** class LSTs. Both are of conventional bow ramp assault-over-the-beach design. The 'Miura' class ships are slightly larger in tonnage and dimensions and can carry more cargo. The 'Atsumi' class was built by Sasebo Heavy Industries and commissioned between 1972 and 1977, whilst the Miura class was built by the Ishikawajima Harima shipyard of Tokyo and commissioned between 1975 and 1977. The 'Atsumi' class can carry 130 troops and 20 vehicles, together with two LCVPs in davits and a third on deck, amidships. The 'Miura' class ships can carry 190 troops and 1,800 tons of cargo or 10 type 74 MBTs plus two LCVPs in davits and two LCM6s on deck. The LCMs are handled by a travelling gantry with folding rails that extend over the ship's side to lower the craft into the water. Any ground forces embarked would have to come from the Japanese Ground Self-Defense Force.

Specification:
Names: *Atsumi, Motobu* and *Nemuro*; *Miura, Ojika* and *Satsuma*
Commissioned: 'Atsumi' class 1972-7; 'Miura' class 1975-7
Displacement: 'Atsumi' 2,400 tons and 'Miura' 3,200 tons full load
Dimensions: 'Atsumi' class length 89 m (291.9 ft); beam 13 m (42.6 ft); draught 2.6 m (8.5 ft); and 'Miura' class length 98 m (321.4 ft); beam 14 m (45.9 ft); draught 3 m (9.8 ft)
Propulsion: two diesels delivering 4,400 hp to two shafts
Speed: 14 kts
Complement: 'Atsumi' 100 and 'Miura' 118
Troops: 'Atsumi' 130 and 'Miura' 190
Cargo: 'Atsumi' 20 vehicles and three LCVPs; 'Miura' 1,800 tons of stores or vehicles, or 10 MBTs, plus two LCVPs and two LCM6s
Armament: 'Atsumi' two twin 40-mm AA guns; 'Miura' one twin 76-mm (3-in) Mk 33 AA gun, one twin 40-mm AA gun
Electronics: 'Atsumi' one OPS-9 radar; 'Miura' one OPS-14 radar, one OPS-16 radar, one GFCS1 fire-control system

In spite of her many islands, Japan does not maintain a significant amphibious warfare capability. The largest vessels, the 'Miura' class, can accommodate and land up to 190 troops at a time, together with up to 10 MBTs.



Armed Forces of the World

South Africa Part 1

South African Army

The South African Army may be regarded as a citizen's army, with its main strength found by conscripts formed around a nucleus of regular personnel. The regular force consists of about 15,500 personnel (excluding 2,000 women, but including 5,500 Black and Coloured regulars) who administer and train some 50,000 conscripts at any one time. These conscripts serve two years initially, and then spend 12 years on an active reserve with annual training periods amounting to a total of 720 days during that period. After the 12-year period most citizens are transferred to the Active Citizen Force for possible recall to the army up to the age of 60, and thereafter they may join Commando local-defence forces. To these military formations can be added the Police and Police Reserves, and also the special defence forces responsible for the local defence of key industrial and military sites. Active reserves total 130,000.

Since the United Nations arms embargo of 1967 South Africa has spent a great deal of time and effort to build up its own indigenous arms industry. As a result of licence production agreements and the efforts of local design establishments, South Africa is now completely independent in arms production, producing everything from ammunition to vehicles and artillery. This includes electronics, optics and communication equipment. Some existing equipment has been updated to increase its useful service life, a typical example being the development of new ammunition for the ex-British 140-mm (5.5-in) guns. The standard service rifle is now the locally-produced 5.56-mm (0.22-in) G-4 rifle, a local derivation of the Israeli Galil. Also in service is the 7.62-mm (0.3-in) and Heckler Koch G-3. Machine-guns include the Belgian FN GPMG and the Browning machine-guns. Of the latter the 7.62-mm (0.3-in); version is produced locally with some modifications. Trucks and mechanized infantry combat vehicles are all locally designed and produced, as is much of the general support equipment such as trailers and medical equipment.

The army is divided among nine territorial commands, a recent addition being the South West Africa Territory Force (SWATF) operating only in South West Africa (Namibia). The army contains both all-white and all-Black and Coloured regiments. The standard language is Afrikaans, only one regiment using English. Some mechanized regiments are all-white, but many of the infantry regiments are all-Black, including some locally-recruited units such as the Bushman's Battalions. Most of the mechanized regiments rely on reserve personnel to bring their operational numbers up to strength in an emergency.

RATEL is an infantry fighting vehicle developed to replace the British-supplied Saracen APC. Main armament can be a 20-mm cannon, 60-mm mortar or, as here, a 90-mm gun.

The standard South African tank is the Olifant, an updated Centurion, of which some 250 are in service, while reconnaissance units use the Eland Mk IV, a locally-produced armoured car of French origins. Some 1,400 Elands are currently in use. The MICV is the Ratel, produced to the extent of 1,200 vehicles in several forms, and additional protected mobility is derived from the widespread use of about 500 mine-proof vehicles such as the Buffel and Bulldog. Mine-proofing is also used on several variants of the locally-produced SAMIL trucks, and on some special patrol and police vehicles such as the Wildebeest. The bulk of the artillery uses about 75 140-mm guns (ex-British 5.5-in), 40 or more of the new 155-mm (6.1-in) G-5 howitzer and some 65 elderly 25-pdrs. Anti-aircraft defence is provided by 25 40-mm Bofors guns, 15 94-mm (3.7-in) AA guns, 55 K-63 twin 35-mm AA cannon, 24 Cactus and 54 Tigercat SAMs, and a number of 20-mm AA cannon. Rocket artillery is provided by the 127-mm (5-in) Valkiri, and the infantry uses 106-mm (4.17-in) recoilless rifles, some 90-mm (3.54-in) guns on 6-pdr anti-tank gun carriages, about 90 6-pdr and 17-pdr anti-tank guns, and SS.11 and about 120 ENTAC anti-tank guided missiles. Mortars include 60-mm, 81-mm and 120-mm weapons.

One arm of the SADF separate from the rest of the army is the Surgeon-General's Arm. This is responsible for all medical services including ambulance, field medical services and military hospitals. The SADF is unique in this aspect of having a separate medical arm.

The bulk of the South African army's activities in recent years has been anti-SWAPO operations on and over the Angolan border. These operations often take the form of deep penetrations into Angola by mechanized columns backed up by aircraft and some special-force units such as the special reconnaissance SAS-type unit and parachute units. These penetration units will gradually be replaced by SWATF units, which will be South West African in name only as most of the personnel will continue to be SADF in origin.

The 155-mm G-5 howitzer has a range of about 30 km (18 miles). In addition to its HE projectiles it has been credited with nuclear capability.

South African Army order of battle

two divisional HQs (one armoured and one infantry)
one armoured brigade (two tank and two mechanized infantry battalions)
one mechanized brigade (one tank and three mechanized infantry battalions)
four motorized brigades (one armoured car battalion and three infantry battalions)
one parachute brigade (three battalions)
one special reconnaissance Commando
four medium artillery regiments
nine field artillery regiments
seven light anti-aircraft artillery regiments
one anti-aircraft missile regiment (five batteries)
15 field engineer squadrons
three signals regiments